



Ref 38  
**Environmental Protection Agency**

2200 Churchill Road, Springfield, Illinois 62706

APPLICATION FOR PERMIT  
TO DEVELOP A SOLID WASTE  
MANAGEMENT SITE

Waste  
Check if  
Applicable

- ☒ Storage  
☐ Transfer  
☒ Processing  
☒ Recovery  
☐ Incineration  
☐ Other

In Accordance With The Environmental Protection Act

All information submitted as part of the Application is available to the public except when specifically designated by the Applicant to be treated confidentially as regarding a trade secret or secret process in accordance with Section 7(a) of the Environmental Protection Act.

APPLICATION MUST BE SUBMITTED IN DUPLICATE

RECEIVED

NOV 19 1980

PART I - APPLICANT INFORMATION

E.P.A. - D.L.P.C.  
STATE OF ILLINOIS

A. Site Identification

1. Name of Applicant John M. Suarez  
(Person responsible for operation)

2. Address of Applicant P. O. Box 187  
(Street, P.O. Box, or R. R. #)

Alton Illinois 62002  
City State Zip Code

Telephone: (618) 254-4381  
(Area Code) (Number)

3. Name of Land Owner Chemetco, Inc.  
(If same as above, so indicate)

4. Address of Land Owner P. O. Box 187  
(Street, P.O. Box, or R. R. #)

Alton Illinois 62002  
City State Zip Code

STPR 5/15/79  
LPC-7 Rev. 5/79

Notification Sent  
Per I. E. P. A. Act §39 (c)

NOV 20 1980

EPA Region 5 Records Ctr.



347289

DL/NPC

SCREENED BF

5. Name of Site Chemetco, Inc.

6. Address of Site P. O. Box 187  
(Street, P.O. Box, or R. R. #)

Alton Illinois 62002  
City State Zip Code

Madison County Chouteau Township

7. Land ownership (Check Applicable Boxes)

( ) Presently Owned by Applicant ( ) To be Leased by Applicant For      Years

( ) To Be Purchased by Applicant ( )      Years of Lease Remaining:  
Termination date of lease                     

Operated by: Ill. Corporation (X) Partnership ( ) Government ( )  
Individual ( ) Other ( )

B. SITE BACKGROUND (Check Applicable Box or Boxes)

8. (X) This is an existing operation begun Nov. (mo.) 1969 (yr.)

( ) this is a proposed operation.

( ) This is a proposed extension of an existing adjacent operation:

(X) Illinois E.P.A. Permit No. 119801 AAC :

( ) No Illinois E.P.A. Permit.

## PART II - LOCATION INFORMATION

A. ZONING AND LOCAL REQUIREMENTS

9. Present zoning classification of site Industrial

10. Does present zoning of site allow the proposed usage?

(X) Yes ( ) No.

11. Restrictions (if any) None

12. Check applicable boxes which describe the use of adjacent properties surrounding site.

	Residential	Commercial	Industrial	Agricultural	Others*
a. North	( )	( )	( )	(X)	( )
b. East	( )	( )	( )	(X)	( )
c. South	( )	( )	( )	(X)	( )
d. West	( )	( )	( )	(X)	( )

\*SPECIFY USE CLASSIFICATION \_\_\_\_\_

13. a. Are there any permits, operational requirements, licenses, or other requirements or restrictions by any municipality, planning commission, county, county health department, state agency, or other governing body?  
 ( ) Yes ( ) No If yes, List below. \_\_\_\_\_

Refer to Exhibit "C" \_\_\_\_\_

- b. Have these requirements, licenses or restrictions been approved by the agency or governing body having jurisdiction?  
 ( ) Yes ( ) No N/A
- c. If the answer to (b) is yes, include photocopies of supporting documents.

#### B. LOCATION

14. Attach a copy of the United States Geologic Survey (U.S.G.S.) topographic quadrangle map of the area which contains the site. (7.5 minute quadrangle, if published).

SEE EXHIBIT I

Quadrangle Map Provided: \_\_\_\_\_  
 Name Date

15. a. Outline on the U.S.G.S. topographic quadrangle map the location and extent of the site.
- b. Provide a legal description of the site. (Typewritten on attached sheet.)

41 Acres in NE Quarter, SE Quarter, \_\_\_\_\_ Quarter,  
 of Section 16, Township 4N,  
 Range 9W, Third P.M.

SEE EXHIBITS 2, 10

16. General characteristic: (Flood Plain, Hillside, Field, Strip Mine, Quarry, Gully, Gravel Pit, Swamp, etc.)  
Briefly describe: \_\_\_\_\_

SEE EXHIBIT 3

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17. Plot the following information on the U.S.G.S. quadrangle topographic map, if within the site or adjacent to the outer perimeter of facility:
- a. Wells (domestic, industrial, etc.) SEE EXHIBIT 4
  - b. Public water sources (wells, stream, etc.)
  - c. Residences or residential areas, commercial facilities, sewage treatment facilities, industries, institutions, etc.
  - d. Other treatment facilities not shown on topographic map such as diverted steams, strip mines, ponds, etc.

If scale of quadrangle map is not sufficient, show the above items on a separate topographic map (See Part IV - A - 23).

NOT REQUIRED - PART III - SITE CHARACTERISTICS

To Be Completed If Land Disposal Of Waste On Site Is Requested

A. GEOLOGY - HYDROLOGY

NOTE: The instructions for this Part of the Application should be read carefully prior to initiating the data-gathering program for the site.

Provide subsurface information in comprehensive detail, sufficient to allow thorough evaluation of the hydrologic and geologic conditions beneath and surrounding the site. This data must fully describe the hydrogeologic interrelationships of the landfill facility, local ground waters, and surface waters. All information requested in sections 18 through 22 should be integrated and presented as a detailed hydrogeologic report.

B. GEOLOGY

GENERAL GEOLOGIC SETTING

18. Provide a brief description of the general geography of the region in which the site is located, and a summary of the hydrogeologic conditions typical of that portion of Illinois.

#### TYPE AND EXTENT OF SUBSURFACE MATERIALS

19. Provide a complete log (description) of each boring made during the exploratory program, and include all other pertinent data so obtained.
20. Include the following information regarding the bedrock, if encountered during the boring program:
  - a. Depth(s) to bedrock.
  - b. Lithology (physical character) and hydrologic characteristics of the bedrock formation.
  - c. Name and age of the formations encountered during the boring operation and (or) which crop out on or adjacent to the site.

#### C. MATERIALS CLASSIFICATION AND ANALYSIS

21. Provide the following information for samples taken during the boring operation:
  - a. textural classification (U.S.D.A. system)
  - b. particle size distribution curves for representative samples
  - c. coefficient of permeability - based on field and (or) laboratory determinations
  - d. ion-exchange capacity and ability to absorb and "fix" heavy metal ions

#### D. HYDROLOGY

22. Provide the following information regarding the hydrologic flow system in the area of the site:
  - a. Depth to water in boreholes at time of boring completion and periodic measurements until the water level has stabilized.
  - b. Rate(s) and direction(s) of ground-water movement.
  - c. A narrative description (with diagrams) of the design and installation procedures for all piezometers installed at the site. This shall include both water-level measuring piezometers and those installed for permanent use as water-quality monitoring points.
  - d. An analysis of the background ground-water quality, as per those constituents listed in the Instructions. Attach a copy of the laboratory report.
  - e. An outline of the procedures, devices, and personnel to be employed for the collection of periodic ground-water samples from the monitoring point(s) installed at the site.

PART IV - CONSTRUCTION PLANS  
AND SPECIFICATIONS

A. SITE DEVELOPMENT PLAN

- SEE EXHIBIT 5      23. Provide a detailed topographic map of the existing site (Scale 1" = 200' or larger) showing 5-foot contour intervals on sites (or portions thereof) where the relief exceeds 20 feet, and 2-foot contour intervals on sites (or portions thereof) having less than 20 feet of relief. This map should show all buildings, ponds, streams, wooded areas, bedrock outcrops, underground and overhead utilities, roads, fences, culverts, drainage ditches, drain tiles, easements, streets, any other item of significance, including legal boundaries.
- SEE EXHIBIT 6      Show the location and elevation of borings as described in Part III - 19, 20.
- SEE EXHIBIT "E"      24. Provide a separate map, at the same scale as that above, of the developed site showing the following:
- a. All changes in topography dictated by design and operational factors.
  - b. All surface features (as specified in IV - A - 23) both unaltered and modified, and installed as part of the facility. This shall include all new construction with location plans for berms, dikes, dams, earth barriers, surface drainage ditches, drainage devices, (culverts, tiles), fencing, access roads, entrance(s), utilities, buildings, sanitary facilities, monitoring well(s), streams, ponds, mines, and any other special construction as may be required to comply with the provisions of the Rules and Regulations.
  - c. Earth barriers, berms, dikes and other barriers, including essential dimensions of each.
25. Provide a topographic map of the closed and covered site showing final contours, with an interval of 5 feet if relief is greater than 20 feet, and intervals of 2 feet if relief is less than 20 feet.
26. Provide plan views (Scale 1" = 200') and cross sections of the leachate collection and treatment system, if utilized, including the following information:
- N/A a. Type, location and construction of subsurface collection system, and all attendant devices.
  - N/A b. Location, dimensions, volume, and surface elevation of treatment lagoon(s), if used.
  - N/A c. Detailed written narrative of the method and processes of the treatment system, and program for monitoring the performance and effectiveness of the treatment system.
  - N/A d. Discharge point(s) of effluent.

B. SCHEDULE OF CONSTRUCTION

- N/A 27. Attach a typewritten narrative supplemented by indications on the plans of the sequence of areas to be developed. Estimate the date of beginning and ending of each phase of construction and operation.

C. CONSTRUCTION REQUIREMENTS

- N/A 28. Attach a typewritten narrative supplemented by indications on the plans of provisions to be made for:
- a. Prevention of surface-water pollution.
  - b. Control of gas migration.
  - c. Elimination of flood hazard, if any.
  - d. Employee facilities.
  - f. Measuring quantity of waste delivered to the site.

PART V - OPERATING PLAN

A. SOURCE AND VOLUME

29. Indicate the estimated quantity of each of the following sources and types of waste the facility will handle during each day of operations; each week of operation; each year of operation. Specify any additional information regarding refuse source and quantity.

<u>SOURCE</u>	<u>TYPE</u>	<u>DAILY QUAN.</u>	<u>WEEKLY QUAN.</u>	<u>ANNUAL QUAN.</u>
a. Residential				
b. Commercial				
	<u>Metal slags</u>	<u>10 tons</u>	<u>60 tons</u>	<u>3000 tons</u>
c. Industrial	<u>Metal skimmings</u>	<u>10 tons</u>	<u>60 tons</u>	<u>3000 tons</u>
d. Agricultural				
e. Other-Industrial				
(Describe)	<u>Metal residues</u>	<u>10 tons</u>	<u>60 tons</u>	<u>3000 tons</u>

B. OPERATING REQUIREMENTS

30. Attach a typewritten description of provisions for:
- a. Personnel for supervision and operation - SEE EXHIBIT 13
  - b. Traffic control - SEE EXHIBIT 13

- c. Designation of unloading area - SEE EXHIBIT 4
- d. Dust control - SEE EXHIBIT 12
- e. Odor control - N/A
- f. Management of surface water - N/A
- g. Erosion control - N/A
- h. Monitoring program for gas - SEE EXHIBIT 11
- i. Reuse and recycling operations - SEE EXHIBIT 7

31. Provide a list of equipment to be used for the operation:

ITEMS	MODEL NUMBER	NO. OF UNITS IN OPERATION	DESCRIPTION
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SEE EXHIBIT 7

#### PART VI - NOTICE / LAND USE

32. In order that notice of intent be sent to those affected by this application, you shall provide these names and addresses to the Agency:

SEE EXHIBITS  
14 & 14A

- a) State's Attorney of the county in which the site is located.
- b) Chairman of the County Board of the county in which the site is located.
- c) Each member of the General Assembly from the Legislative district in which the site is located. (Three Representatives, One Senator)

- d) The clerk of each municipality, any portion of which is within three miles of the site. - SEE EXHIBIT 14  
e) Adjacent landowners to the proposed site. - SEE EXHIBIT 14A  
f) Local zoning and planning agencies. - SEE EXHIBIT 14

Provide the following documentary evidence sufficient to show:

- a) That the facility is located so as to minimize scenic blight, and to avoid damage to archaeological and/or historic sites and areas of significant natural beauty; - SEE EXHIBITS 3, 8, 9
- b) That the facility is located so as to avoid any hazards to public health and safety and to minimize any offenses to the senses of persons residing, working, traveling, and/or in any way spending periods of time in the immediate vicinity. Immediate vicinity is here defined to mean a one-mile radius zone adjacent to the boundary of the site; - SEE EXHIBITS 3, 8, 9
- c) Taking into consideration the character of the area involved, including the character of surrounding land uses and the trend of development, as well as local comprehensive plans and zoning ordinances, that the facility is located so as to minimize incompatibility with the character of the surrounding area. - SEE EXHIBITS 3, 8, 9
- d) That the facility is located so as to avoid causing substantial depreciation of nearby property (taking into consideration, where possible, any mitigation caused by the short proposed life of the site and end use); - SEE EXHIBITS 3, 8, 9
- e) That any detriments caused by removal of the site from its former use are out-weighed by the need in the area for such a facility at this location; - SEE EXHIBITS 3, 8, 9
- f) That the facility is located so as to avoid a continued adverse effect on existing air and water quality; and - SEE EXHIBITS 3, 8, 9 and EPA OPERATING PERMITS
- g) Taking into consideration geological and hydrological factors, the location of the site in relating to sources of solid waste and accessibility to transportation modes, and the technical feasibility and economic reasonableness of disposing of solid waste at the proposed location, that the facility is suited for its intended use. - N/A
- h) That access roads and bridges are not limited to preclude necessary vehicular traffic (i.e. proposed size and weight limits). - SEE EXHIBITS 3, 8, 9

I hereby affirm that all information contained in this Application is true and accurate to the best of my knowledge and belief.

Signature of Applicant: X John Suarez 11-18-80  
Date

Attest: Lesley C. Thompson 11/18/80  
Date

Signature of Engineer: Walla O. Blotz 11/18/80  
Date

Illinois Reg. No: 62-32817

Attest: Lesley C. Thompson 11/18/80  
Date

Signature of Landowner(s): X John Suarez 11-18-80  
Date

Attest: Lesley C. Thompson 11/18/80  
Date

Engineer (Seal)

Signature of other person, technical and non-technical, who has supplied data contained in the submittal.

William L. Montland 11/18/80  
Signature Date

ENGINEER  
Reg. No., Position, Title, Etc.

Engineer (Seal)

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Reg. No., Position, Title, Etc.

(Seal)

SAS:bls/7055A/sp

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NOV 19 1980

E.P.A. - D.L.P.C.  
STATE OF ILLINOIS

C H E M E T C O

EXHIBIT F

MAKE UP

ALL SAMPLES (TO FURNACE OR TO DRYER) WILL WEIGH  
10,000 GRAMS UNLESS CHANGED BY THE SAMPLING FOREMAN.

THE PROCEDURE FOR WEIGHING WILL BE AS SUCH: ALL  
FURNACE SAMPLES SHALL HAVE THE PAN TARED IN BRINGING  
SCALE BACK TO ZERO BEFORE STARTING TO WEIGH SAMPLE. ALL  
WEIGHTS OF PARTS OR FRACTIONS MUST BE ROUNDED OFF TO THE  
NEAREST 100 GRAMS. THAT IS ANYTHING UNDER 50 GRAMS STAYS  
AT ORIGINAL; ANYTHING OVER 50 GRAMS GOES UP TO NEXT. SEE  
EXAMPLE BELOW:

A. 1535 IS 1500

1520 IS 1500

1549 IS 1500

1501 IS 1500

B. 1787 IS 1800

1760 IS 1800

1751 IS 1800

1775 IS 1800

ON MOISTURE SAMPLES YOU WILL DO SAME AS DOING A FURNACE  
SAMPLE BUT YOU WILL RECORD THE READING OF THE TARE BAR AS THE  
PAN TARE WEIGHT IN THE MOISTURE SECTION.

TWO EASY THINGS TO REMEMBER IS WHEN YOU HAVE POUNDS FROM  
BIG BLACK SCALE WORK IN POUNDS UNTIL YOU GET % THEN ALL YOU  
HAVE TO DO TO GET YOUR SAMPLE WEIGHTS IS MOVE DECIMAL POINT TO  
THE RIGHT 2 PLACES AND THIS WILL GIVE YOU YOUR GRAM WEIGHT.

EXAMPLE:  $100 \text{ LB} \div 500 \text{ LB} = 20.00\%$  OR  $20.00\% = 2000 \text{ GRAMS}$ .

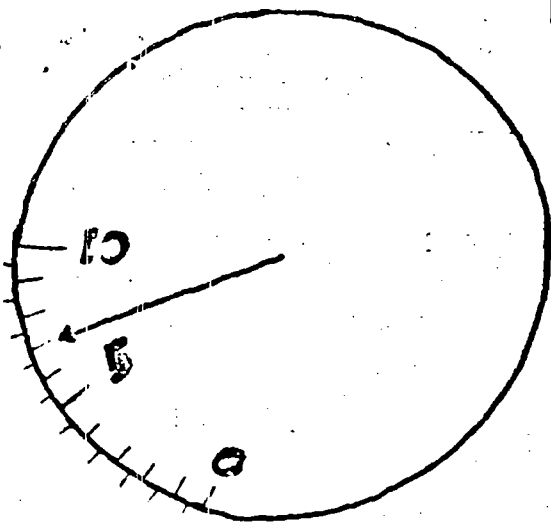
TO CONVERT LBS TO GRAMS MULTIPLY BY 453.59 AND ROUND OFF.

EXAMPLE:  $25 \text{ LB} = 25 \times 453.59 \text{ GRAMS} = 11,340 \text{ GRAMS}$   
 $84 \text{ LB} = 84 \times 453.59 \text{ GRAMS} = 38,102 \text{ GRAMS}$   
 $142 \text{ LBS} = 142 \times 453.59 \text{ GRAMS} = 64,410 \text{ GRAMS}$

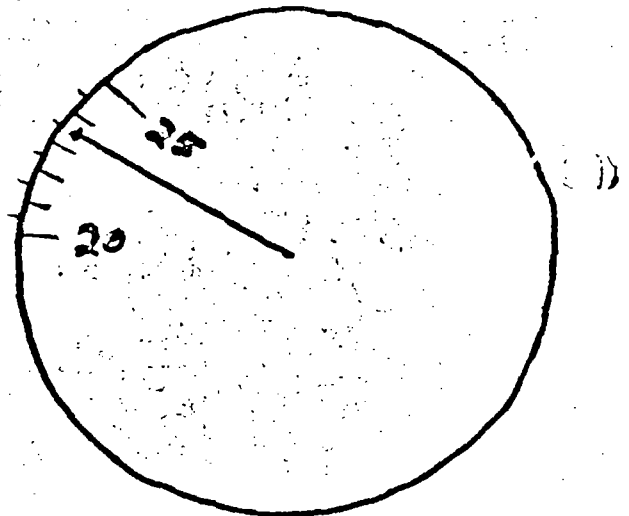
FRANK C. LEFFLER  
SAMPLING

SCREENED BF

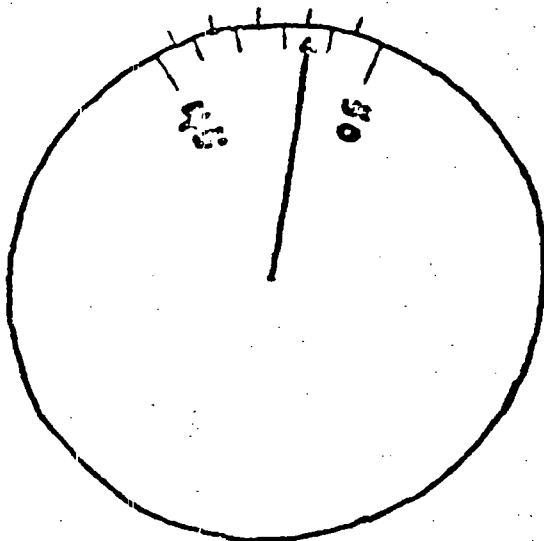
# BLHCK Scale



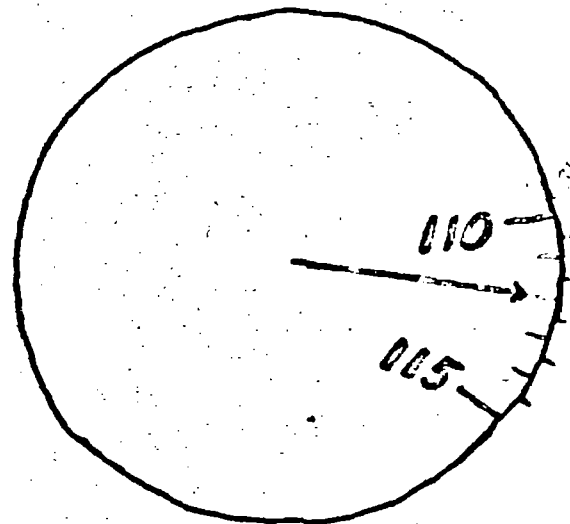
Reading is 7 kg. or 7,000 g.



Reading is 23.5 kg or 23,500 g.



Reading is 48.5 kg. or 48,500 g.



Reading is 112 kg. or 112,000 g.

Remember that the inside marks are whole kilograms or 1000 grams, so count from the lowest visible number in red under the scale hand, adding 1 kg. for every mark on the inside up to the scale hand. If it is between the inside marks, then add .5 kg. or 500 g. to your final number. See examples above.

1 kilogram (kg) = 1000 grams (g)  
.5 kilogram (kg) = 500 grams (g)

## SAMPLING PROCEDURES

In order to uniform and insure that every sample is made up correct, and everyone knows and is talking about the same procedures and terms; these procedures were written.

No sample will be made up unless the Sampling Foreman has told the sample preparer to make it up. This is done to eliminate making up low priority samples and a sample where there are weights and estimates involved that are being furnished by Receiving Foreman.

Every sample must be weighed when brought into sampling to be made up. This weight will be marked on barrel and recorded on L.H.R (Lot Receiving Report) later as the now sample weight. The sample is dumped on the floor and it's HT barrel place next to it. This will insure that this sample will keep its correct lot numbers with it as an identification until the lot is finally made up and has a board tagging it then instead of a barrel.

At this time the Sample Preparer will go into the office and look up the lot write up (Gary's comments on the lot) and check the lot receiving book to make sure the lot number, Shippers name, and material all agree on all sheets. If they agree, the top of a L.H.R. (Lot History Report) is filled in recording Lot number, shipper, Material, Representative and now sample weight.

The sampling foreman will check the write up to the sample with the Sample Preparer and determine if the sample is correct with write up and how the sample is to be prepared. If the sample does not agree or if there is no write up the Sampling Foreman will contact the unloading foreman to see if there is any special material

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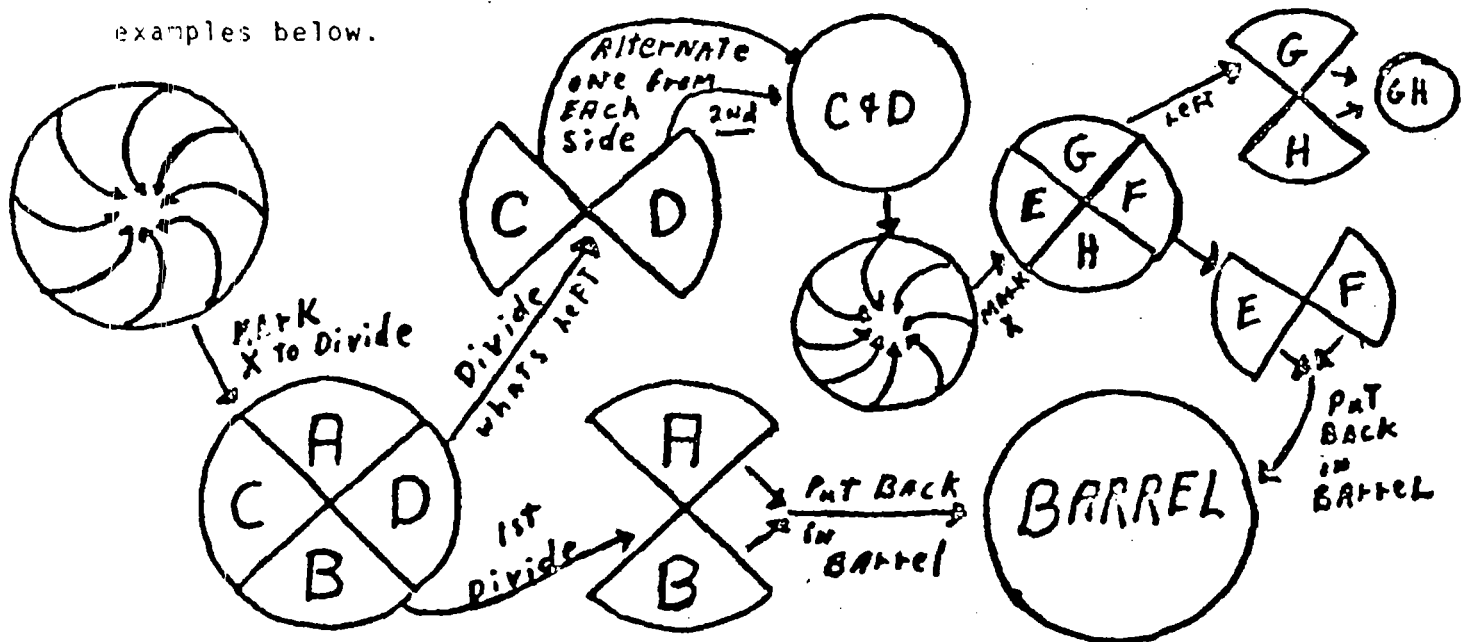
or instruction as per his unloading that he noticed. If not the Sampling Foreman will then instruct the Sample Preparer on which method or way to prepare the sample and how much the melted sample should weigh.

Cone and Quarter is one of the methods and is used primarily on homogeneous material, such as turns grinds, etc.. Any item up to 2" as long as they are homogeneous. It also can be used in conjunction with other ways such as when you crush you must cone and 1/4 the various types of under and oversize. The same would apply to screen material the undersize or oversize, as long as it can be mixed up well enough to get a representative sample.

On Cone and Quarters first mix the pile by going around the outside edge and shoveling the material and placing it on the center or top of the pile this will allow material to go down all over the side of the pile. Then an "X" is marked on the pile and opposite side "A" & "B" of the X are shoveled back into the barrel. This will leave C & D

C & D is then move by taking one shovel of "C" and put it in a pile, then one shovel full of "D" is taken and placed on top of the first shovel full of "C". You will continue this alternating procedure until both "C" and "D" are moved into one mixed up pile.

You then mark an X on the new pile which contains C & D mixed up and divide it into quarters or 1/4's. Follow the previous instructions of shoveling opposite quarters back into the barrels and moving the two remainder quarters by alternating shovel fulls when transferring.



Screening is another method which is used to prepare or divide a non homogeneous sample into a couple of homogeneous parts that can be weighted and proportioned to a representative sample of the lot. It is simply working material back and forth across the top of 1/4" screen until smaller material has been separated from the ~~Larger~~ so that material on top can be sorted or classified.

Ashes are screened using the 1/4" mesh screen to separate the following items; Which will be weighed and proportioned according to their percents of original.

Undersize (the material that fell thru the 1/4 inch screen) this may contain a lot of small wire, grinds, or conbearing items. If this is true then after the sample has been completely screened thru

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the 1/4" screen the undersize will be cone and 1/4 down to approx 10 lbs and put in ball mills to be broken up. Do not put a wet sample in the ball mills instead place the 10 lbs in the dryer for 24 hours then finish processing the sample the next day. When a sample of the undersize comes out of the ball mill it will be cone and 1/4 by the grinder man down to 3 pds and put on the shaking screens which consist of +20 mesh, +45 mess, +100 mess, and -100 mess. When the sample is finished screening approximately 15 minutes later the material is weighed and % are figured. He will also make up 4 bags for our lab and 4 bags for the representative and place corresponding materials in corresponding bags. *ALL BAGS MUST HAVE G.O.'S MARKED ON THEM AS A COMPLETE AND WEIGHTS ARE TO BE* All information are recorded on L.H.R. and ~~weights~~.

Oversize (which is usually material too small to hand pick but can be cone and 1/4 into a representative sample of this proportion) is usually shoveled from off the top of the screen after the larger pieces of Cu wire and solids, or large CBM, or non Cu bearing items are hand picked off the top of the screen and placed into their corresponding boxes. Upon completion of the screening the oversize will be weighed and then dumped out and cone 1/4 down to approximately 40 pds or whatever proportion will be needed to make up two samples a moisture and a melted sample, all information and weights must be recorded on L.H.R.

Hand picked item off top of screen are of various types and have to be sorted in other to control and insure that a representative sample will be melted and a correct assay given. Some of these sorted items are Cu wire & Cu solids (in same box), brass, Irony Cu & bages above 50%, Irony Cu & Brass above 30. Irony Cu & Brass below 30% Cu., and non Cu items such as Steel, al, wood, nags, rock, etc..

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An item like armatures or fields may be broke out into its own catagory if there is a noticeable amount. All of these items are weighted separately and recorded on L.H.R. In making up sample the Sample Preparer must use his judgement when taking various items out of the boxes to make up the proportion. In case of any problems or questions the foreman must make the decision.

Skims or Splatters (which are rich metallic pieces) which contain a % of fines will also be screened to determine % of fines. The Skims will also be sorted accordings to Cu, brass, al, or slag. The slag portion can be crushed to make it more homogeneous or cone and 1/4 able.

Copper Bearing Material may also be screened along with the usual sorting if lot contains are good % of fines. The foreman may choose a cone and 1/4 of the item if they are large enough and homogenous enough after a sort if it would prove more beneficial.

It must be remembered that all information such as names, weight, %, etc., must be recorded on the L.H.R. as a permanant record to show the people who examine the L.H.R. later just exactly how and what was done to arrive at this the correct assay for this lot. These procedures maybe questioned and even improved but the only way to grow is by learning and looking and you can't do this if you have no record of what you did in the past.

Crushing and Screening (usually used on all slags and some skims) is done to break up large items and make them in top homogenous or cone and 1/4" size material.

Material is dumped on and hand fed into the crusher, picking out any free metal before crushing. The free metal is sorted into brass, al., copper, or non cu bearing. Do not at anytime reach or insert your hand or any other part of your body into the jaws of the crusher. It is a machine and can not tell the difference between skin and rock and will crush them both.

While the material that comes out of the bottom of the crusher is being run over a 1/4" vibrating screen. A sample preparer is hand picking the large skims off the top of this screen, and placing in corresponding pans for copper, brass, al., and no Cu value pan. The oversize is pushed off the end of the screen into a barrel to be weighed up after completion of crushing and screening.

There are at least two and possible more parts involved in a Crushing and Screening.

A. Undersize: (Material that falls thru the 1/4" screen)

Is weighed, cone and 1/4" and sent direct to ball mill some 10 pounds if dry. If not put in dryer for 24 hours then put to ball mills. When it comes out of ball mill it will be ran across the +20, +45, +100, -100 shaking screen inside the office and bagged up in corresponding bags marked with % of this screen test on each bag so a composite can be run.

- B. Oversize: (+1/4" to 2" in size) Weigh, cone and 1/4 and prepare to melt this % along with % of skims found in next section.
- C. Free metallic section or Cu skims, brass skims and al skims will be weighed individually and proportioned into the melted sample. Again I say make sure all information and weights are recorded on L.H.R. If there is a portion of non copper bearing items this will be weighed, % made, but left out of melted sample.

Moisture sample should be run on everything if possible. This will include running a control on all turning samples for oil.

Moistures should be made up as a duplicate of the melted sample. If the moisture sample and the melted sample are the same sample, that is we are going to melt the dried sample, then it should be noted in the moisture book and on the L.H.R. Copper mud is a good example of this.

Any material that is going into the dryer before being processed by the ball mill should also be noted, both in moisture book and on L.H.R.

When running a moisture sample such as slimes which come in large balls; you should chop up the balls into the smallest possible size usually down to at least 1" in diameter.

Moisture or Copper mud are done as follows a pan is turned in on scale then the sample is cone and 1/4 down to approximately 40 pounds which will be placed into the al pan for burning. The net wet material must be recorded, since this is the basis for our moisture computation. Then the pan is set off of the concrete in a level place and fuel oil and gasoline is poured on it. The mud is then set on with about 2 or 3

more times of pouring fuel oil on the sample and lighting it. MAKE SURE the mud in pan is fairly cool and fire is out before you try to pour additional fuel and re-light the fire. It can blow up and burn you. When the sample is completely burned to dryness it will then be weighed placing pan \_\_\_\_\_ weigh and this weight called the net dry weight will be subtracted from the net wet weight to give the moisture weight loss. The moisture weight lost will be divided by the net wet weight to give the moisture % of the lot.

All Moistures must be recorded in moisture book.

On turnings which have balls of the same type turns mixed in with small chip and turns that could be cone and 1/4 by themselves; you must pull out the balls and weigh them separate. Trying to keep like turns together whenever possible for weighing and % back into the melted sample.

A control (which is simply a **grab** sample taken from the material after breakdown at random places) is put into one of the small plastic bags which has Shipper, Lot no., Material and Control marked on it. It is then sent to the lab. On turns it will be for oil. On ashes or fines it will be chlorine.

A direct sample is a small control sample of the lot done only on homogenous items, such as cu clad wire, grinds, and fines. All bags with direct samples in them will be marked as such "Direct".

Some of the properties of copper is that it is red in color, non magnetic, soft to bend aluminum is white in color, light in weight, does not spark on a grinding wheel, and non magnetic. Zinc is a gray in color, heavier than al. but much lighter than steel, non magnetic, does not spark on a grinding wheel, and semi hard in appearance. Steel or iron is silverish gray, magnetic, heavy in weight hard in strength, and will spark on a grinding wheel.

Stainless steel is non magnetic, hard in strength, silverish gray in appearance, and sparks on a grinding wheel.

The best way to tell steel from al. is by its weight steel is heavier than al, and steel is magnetic where as al isn't.

When you have a white metal and it is not magnetic. Feel it for weigh al is alot lighter than, Zinc or Stainless steel. The Al and Zinc will not spark but the Stainless will.

"Pb" Lead is another white metal very soft. You can even scratch the surface with your finger nail. If you were to scratch it would have a tendancy to ball or push forward infront of whatever you are gouging with. Lead is also non magnetic, very heavy in weight, and will not spark to a grinder.

Brass is yellowish in color and if there is a good amount of manganese in it, it will have a greenish cast to it.

Bronzes are inbetween the yellow and red usually with a lighter color yellow more whitish.

You can not always tell by color, along with color goes the texture of the turning, there will also be a very slight pull to some Al Bronze material.

In sorting, the pure items should be placed in boxes by themselves. Example copper whether it be wire or tubing makes little difference as long as there is no insulation or other contamination.

Brass if pure should be pulled out by itself. The foreman will tell you if you need to separate the brass down more into various types.

Then you would separate such items as armatures, cu clad wire, fields, stators, insulation wire, transformer, and electronic breakages according to size and look alike. For example an armature can have a shaft in it or not, a fan attached or not, a commutator or not, and can even have other miscellaneous attachments. Armatures can vary in sizes small, medium, large, and extra large. The windings of the armature can also vary from all copper wire, to half copper half aluminum, or all aluminum. Item in the sample should be sorted or classified with mixed elements in to copper percents if possible. Above 50%, above 30%, above 15%, and below 15%. This will take a lot of training and knowledge to be able to do this which comes only with time and experience. There will be Irony Cu and Irony Brass in the same box as long as they both are equal in copper unit value.

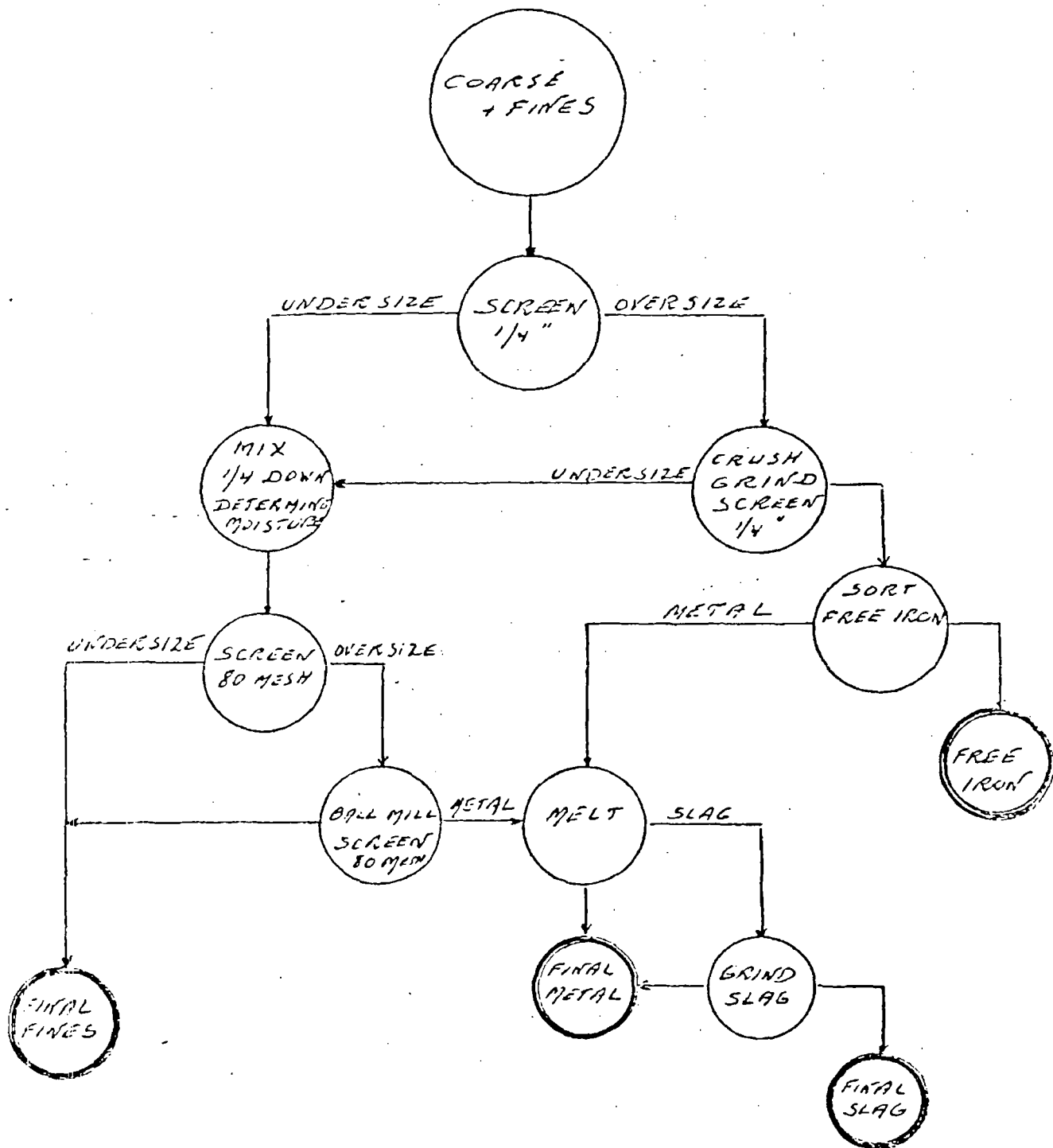
You can not tell from surface appearance only you have to file and use a magnet. Your eyes will deceive you and a person can not tell by just looking at it you must test it by magnet, and filing and feel of weight. Even after all of this there will be times that you still don't know but, the foreman will be there to help and get the answers some how.

The Sampling foreman may change or vary the procedure a little to meet the sample. There will also be experimental lot books that show various items and <sup>also oxygen</sup> percentage. I am also making up special books that we have group items with corresponding breakdowns. These books are an instrument of learning and knowledge to be used by all Chemetco employees that are effected. Sample Preparers, Lab Sample Processors, Furnace men, Foremans, Buyers, all may use them but they will be stored at all times in the Sampling office along with these procedures.

How to fill out a L.H.R. properly. Take all information that is needed to fill out the top such as Shipper, lot, number, material, and representative from the daily log.

From there down you will list only the correct description of the lot as you see it. All parts must be listed along with there corresponding weights. It is the sample preparers responsibility to fill in the L.H.R. all the way down to the melted weight, including the moisture. He is also responsible to make sure the moisture, control, direct, or melted samples are taken marked correctly on bags and in lab record books.

# SAMPLING OF COPPER RESIDUES



## WARWICK FURNACE

Used to melt and pour "Pb" lead bearing samples

Protective clothing must be worn while working this furnace

- A. Asbestos gloves
- B. Asbestos coat
- C. Face shield with Alum. shroud
- D. Leggins
- E. Yellow respirator(if possible)

## No. 1 FURNACE

Used to melt or matte regular samples of copper bearing items

Protective clothing:

- A. Asbestos gloves
- B. Asbestos coat
- C. Leggins
- D. Face shield with Alum shroud over helmet

## No. 2 FURNACE

Same as No. 1

Some things to watch out for on hot material and steps.

1. Inspect protective clothing everytime before using.
2. Get new ones if old ones or torn and don't do what they are worn for.
3. Inspect the chain and wiring of the hoist for possible danger signs, such as bare wires and worn weak links.
4. Keep area clean and place everything in its place so to prevent an accident.
5. Keep hoods pulled over furnace whenever possible to allow exhaust system to work more efficiently.

On lighting furnaces follow this procedure:

- A. Take lid off furnace
  - B. Turn on hood exhaust system
  - C. Turn on blower to air
  - D. Allow 5 minutes safety time for exhaust system to clear out any gas that might have accumulated from a leak or other source
  - E. Then light a paper bag and place a burnt wooden pole in furnace with it
  - F. If there is a flame going in the furnace then turn on gas by tripping lever valve. Do not leave, stay there so you can shut gas lever off in case the flame goes out before furnace catches.
  - G. After you are confident furnace has caught and is burning on its own, then place lid on top of furnace and pull hood over.
- (Repeat operation for lighting other furnaces)

## SAMPLING PROCEDURES

In sorting solids we use a grinding bit to clean the surface, then we put a drop of 2% Ag No<sub>3</sub> on them. Aluminum Bronze will stay clear and is slightly magnetic. Manganese Bronze should turn black and is slightly magnetic. We sort by black, gray and clear colors, and we separate even farther between magnetic and non-magnetic. After the sort you should list some of the items in that part.

Example 1: Clear, slightly magnetic, gears, sleeves, small castings and rods.

Example 2: Black, slightly magnetic, propellers, large sleeves, pump housings, etc.

Solids usually will be drilled at least four per part and representative percentages of parts will be marked on corresponding bags and LHR.

Shredded Scrap will be coned and quartered down to 10,000 grams, and a sort of copper, brass, radiator pieces, irony copper or brass greater than 40%, irony copper and brass below 40%, fines and small mixed material and (Iron, Aluminum, Zinc) non-copper items. Everything will be melted except the non-copper items. All percents and descriptions of parts are marked on the LHR.

Two-and-One wire is usually run by clipping a representative portion of the roll, then unwound and weighed, copper verses clad giving the percentage, then the clad is sent direct to the Lab. When you have two small copper and one large clad the percents are approximately 52.27% for the small gauge copper and 47.23% for the clad large gauge. If you have all equal wires, the percents are approximately 68.91% for copper large gauge, 31.09% for clad large gauge.

Copper Clad wire is usually sorted by gauges, checking for galvanized or steel wire with a file. On chopped copper clad we will weigh approximately 1,000 grams, grab sample, and check for copper with a magnet, writing the percent copper and percent clad on the LHR, but sending only copper clad to the Lab direct. Normal assay is 30 to 33% unless it is green line wire then it is 37 to 42%.

Commutators are sorted into groups. Watch out for these types.

- A. Bakelite center only, 60 to 70%, some larger diameters in the 40's.
- B. Steel Centers--55 to 65%.
- C. Die Cast Centers--40's to 50's.
- D. Extra wire (Hair pins) attached.
- E. If collars or not.
- F. Size--small or large.
- G. Slip ring or double ring--58 to 65%.
- H. Flat Alt. type--39.20%.

Fields can range anywhere from 15% to 40% depending on the thickness of the body and the number of windings. The more windings and the smaller the thickness of the body, the higher the percent copper.

Armatures run 15 to 30%. Some of the things that affect the copper percentage of armatures are:

- A. Shaft length, longer the length the lower the copper.
- B. Body length and diameter, usually the shorter the body, the higher the copper.
- C. If commutators attached or not, commutators raise the assay.
- D. Extra Iron attached would lower the assay.

Reefer ends (Steel end plate, copper tube and aluminum fins), normally will run 30 to 45%. The assay depends on how close it was cut to the end.

Cocks and Faucets (average assay is 69%) check for:

- 1. Drain pipes--usually yellow brass
- 2. Die cast faucets instead of red brass
- 3. Irony attachments
- 4. Sample melted

Plastic Brush Holders runs around 28 to 32%.

Telephone Bells--assembly including coils with brass bells--43 to 45%.

Encapsulated coils can run all over from 25% to 95%.

Field Coils are high, usually wrapped in paper or rubber and found inside of starters, generators, or alternators, approximately in the 90's.

Small plastic coils, no iron, run maybe 60 to 80%

Solenoids run around 26% depending on attachments.

Ignition coils do vary depending on steel or plastic coating but normally run around 19 to 20%.

Voltage Regulators usually run in the high teens or low twenties depending whether they have cases or not.

Electronic Scrap--large boxes, etc. usually runs low due to large amounts of iron--10% to 20% copper.

Transmission coolers or Radiator coolers usually run in the 50's from 45-60% range.

Fiberboard or Circuitboard is another wide ranger.

1. Fiberboard (with thick fiber center, copper coating on both sides) runs 27 to 32%.
2. Fiberboard, with one copper side runs 5 to 25% depending on whether solid copper plated or large empty spaces between circuits.

Foil which is similar to Fiberboard usually runs:

1. Copper both sides, cloth center--70%.
2. Foil with enamel backing runs in the 80's.

Pressed Graphite and Copper Material

1. We have received from Solothern and Patterson (Sentir Ring) pressed material copper in color running 12.79%.
2. Copper looking, pressed brushes, usually run in the 80's.

3. Black colored press rings  $1\frac{1}{2}$  inches in diameter will run 45-50%.

4. Graphite Brushes with copper leads run 32%.

Cal Rod or Heating elements run 28% for large with spring to 69.82% for small.

Primers from shotgun shells usually is a clad material and runs around 19 to 20%.

Bull noses vary somewhat due to whether they have sweated the lead out or not; 19 to 22% not sweated.

Shell Casings made out of 70-30% brass running approximately 67%.

Transformer runs 19 to 25%

Thermostats (from automobiles) run 33 to 35%.

Telephone Switches, finger type relays run 35%.

Diodes--Large type from Alter run 24.89%

Smaller type from Commercial Metal, Etc. run 58 to 60%.

Insulated wire has various types.

1. Figure "8" or self supporting
2. Drop wire (two copper clad wires inside of insulation runs in the 20's.
3. Communications cable varies but usually in the 40's to 50's.
4. Single strand runs in the 50's to 60's.
5. Auto harness wire run 40 to in the 60's.
6. Extra heavy insulation runs 25 to 40%.
7. Insulated copper cable, thin walled insulation runs in the 80's to 90's.
8. Steel shielded cable runs 70 to 80%.
9. Steel shielded insulated wire runs 20 to 35%.
10. Coaxial cable runs 27 to 30%.

C.B.M. or Copper Bearing Material is usually sorted to look alike first, then if we can combine some material according to the percent of copper we do. We also sort according to the percent of copper if we don't have many look alike. A lot of the C.B.M. we get contains a good percentage of fines and small material under one inch which we call accordingly. Each proportion is weighed and a percentage of raw material is determined for the sample. We also list or give our estimate of copper in each proportion along with the description on the LHR.

On problem shippers we make up two identical samples and put the second sample behind the furnace. This enables us to look at what made the material run higher or lower when a remelt or any question is asked.

Ashes are handled differently. They are run across the Big Screen to pull out any large C.B.M. or whatever. We then weigh each size from off the screen. It may also be that we have to sort the larger material according to copper percent or look alike.

Skims or Slag is usually crushed, screened and sorted.

1. Undersize is what passes through a quarter-inch mesh screen.
2. Oversize ranges from  $\frac{1}{4}$ -inch up to approximately 2 inches.
3. Metal or skims picked off the top of the screen as we screen it is sorted between iron, copper or brass looking.
4. Each part is weighed and proportioned into a melt sample leaving out only iron, paper, wood or no copper value items.
5. Under and over sizes are coned and quartered but skims or metal section is hand picked, trying for the closest representation possible.

Skims with a lot of fines or small turns will be run over the Big Screen first, then the oversize. If it contains a lot of skims that would break up, it would be crushed, if not a sort would be done on splatters and skims.

Turnings usually come in the following categories:

- A. Homogeneous
- B. Two or more types mixed together
- C. Solids or skims mixed in
- D. Balled turns mixed in
- E. Contaminated by iron, aluminum or no copper items

First we will pull out the balled turns, skims and solids or anything that is not cone and quarterable. We will then mix it up and cone and quarter the pile and take a grab sample or control which is sent to the Lab direct to determine the oil. We will proportion the parts into a moisture and melt sample. The solids will be checked with acid and a magnet to determine type. This description along with the results of the acid and magnet tests will be recorded on LHR.



P.O. BOX 187 • ALTON, ILLINOIS 62002  
(618) 254-4381 • TELEX: WU44-2481

EXHIBIT G

OTHER PERMITS

Illinois Plant Operating	-	No. 119801 AAC
Furnace Operating	-	No. 119801 AAC
NPDES	-	No. IL0025747
Federal RCRA	-	No. ILD048843809

EXHIBIT 2

NAME CHANGED  
TO "CHEMICO INC"

OPTION CONTRACT

The undersigned in consideration of One and No/100ths Dollars paid gives to CHEMICO METALS CORP. an option to purchase, property known as:

A part of Section 16, Township 4 North, Range 9 West, of the Third Principal Meridian, more particularly described as follows: Beginning at the southeast corner of said Section 16; thence South 89° 31' West a distance of 561 feet; thence North 0° 29' West a distance of 372.9 feet; thence North 20° 4½' West a distance of 1,392.3 feet; thence North 80° 18½' West a distance of 717.39 feet; thence North 14° 56½' East a distance of 1,361.03 feet; thence South 80° 31½' East a distance of 1,317.19 feet to a stake; thence South 15° 00½' West a distance of 209 feet to a monument; thence South 14° 37½' West a distance of 1,120.1 feet to a stone; thence South 20° 02' East a distance of 1,255.58 feet; thence South 1° 02½' East a distance of 425.04 feet to the point of beginning; except that part thereof conveyed to the St. Louis, Chicago and St. Paul Railroad Company by Deed dated March 29, 1893, recorded in Book 222, page 15, Recorder's Office of Madison County, Illinois; situated in Madison County, Illinois.

EXCEPTING therefrom that portion of the above-described property which lies south of the centerline of a 50-foot road which extends in a southeasterly direction from FAI Route 151.

The tract to be conveyed hereby contains 41.17 acres, more or less.

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C H E M I C O

# LEWIS AND CLARK INDUSTRIAL AREA

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E.P.A. - D.L.R.C.  
STATE OF ILLINOIS

Civic  
Memorial  
Airport

CHEMETCO

CHEMETCO

EXHIBIT 3

Lambert  
St. Louis  
Municipal  
Airport

ST. LOUIS

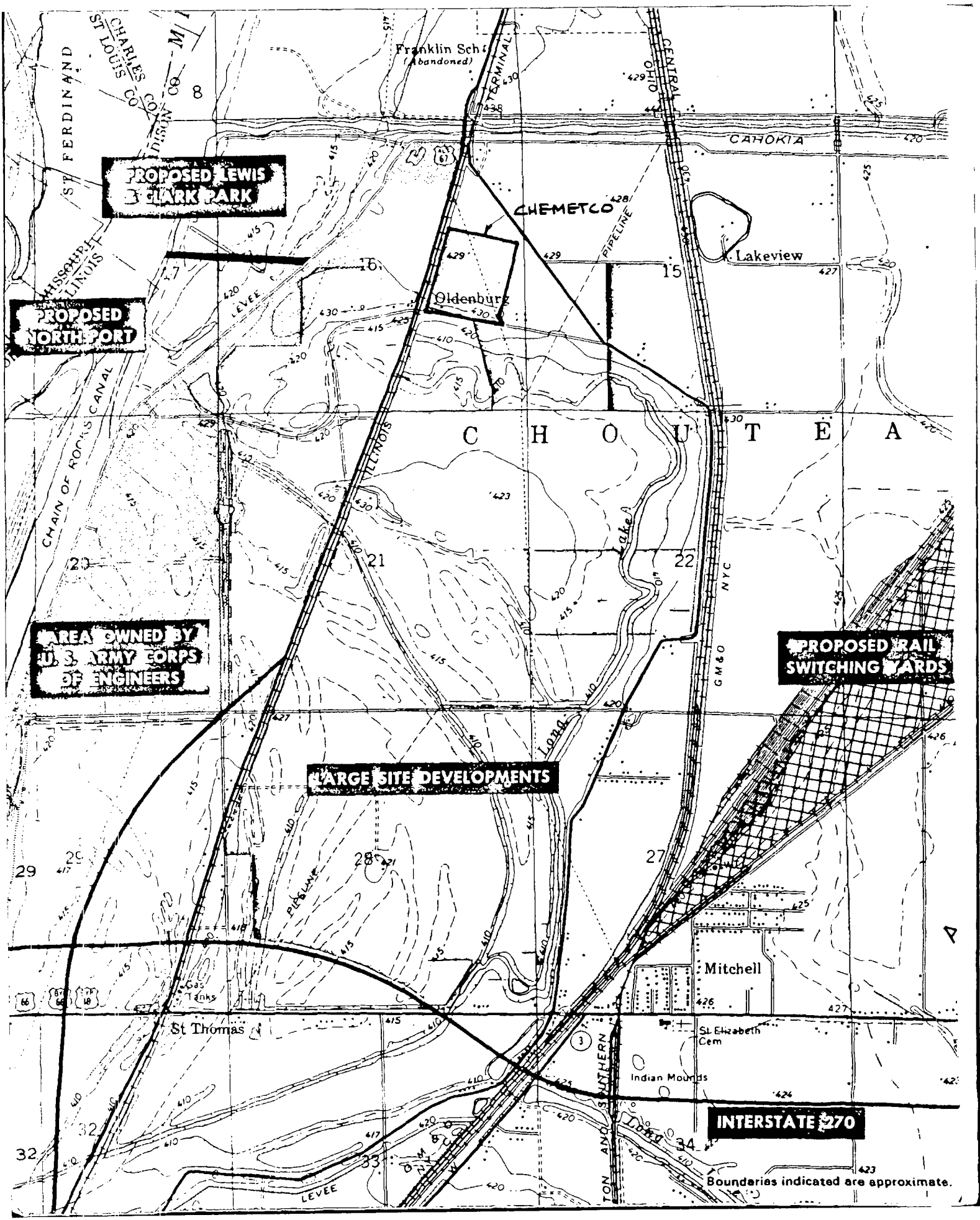
Parks  
Metropolitan  
Airport

Missouri

Illinois

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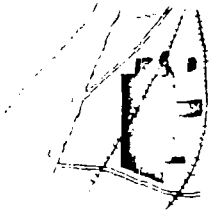


**INTERSTATE 270**

Boundaries indicated are approximate.

# LEWIS and CLARK INDUSTRIAL AREA

## DESCRIPTION AND LOCATION:



The area shown comprises over 1400 acres owned by Union Electric, 20 minutes from downtown St. Louis. An additional 500 plus acres adjoining the Chain of Rocks Canal is owned by the U. S. Army Corps of Engineers and is zoned for industrial use. The area is bounded on the north by the Cahokia Drainage Canal, on the east by the Gulf, Mobile & Ohio and New York Central Railroads, on the south by Interstate Highway I-270, and on the west by the Chain of Rocks Canal. This is part of an area consisting of over 8000 acres available and zoned for industry.

## UTILITIES:

**Electric Service**—The area is served by the Union Electric Company. As a member of the Mid-America Interpool Network and Mid-Continent Area Power Planners with a total electric generating capacity of over 57 million kilowatts, Union Electric Company is prepared to meet the requirements of any company that would locate in the area.

**Gas Service**—Three gas transmission pipelines of the Mississippi River Fuel Corporation cross the area. Natural gas of 1000 BTU per cubic foot is provided.

**Treated Water**—is available from supply mains of the Mitchell Public Water District located along the southern and eastern edges of the site area. In addition, the Tri-Cities Regional Port District has authority to construct and provide a water system to this area.

**Ground Water**—The most favorable water yielding deposits occur at depths of 60 feet and below. A properly designed well would produce as much as 2000 gallons per minute. The water available from these alluvial deposits is, in general, of good quality. A small amount of iron might be expected which can be removed by aeration.

The proximity of the site area to the Mississippi River presents the opportunity for developing a river intake. Practically unlimited supplies of river water are available.

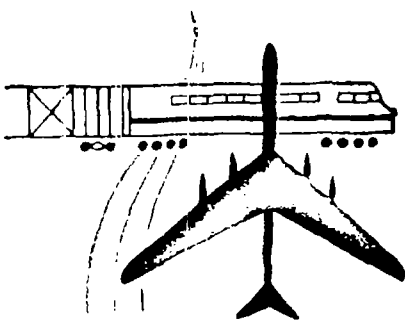
**Waste Disposal**—There are at present no sanitary sewers in the site area. The Illinois Sanitary Water Board permits sanitary sewage to be processed in primary treatment facilities when the effluent is discharged directly to major streams such as the Mississippi River. The Tri-Cities Port District has the authority and expects to construct the sewer facilities in this area.

## TRANSPORTATION:

**Railroads**—The area is served by the New York Central, and the Gulf, Mobile & Ohio Railroads. In addition, the Illinois Terminal Railroad, which traverses the site, and the Alton & Southern Railroad provide connections with the 18 trunk line railroads that serve the Metropolitan St. Louis area. St. Louis is the nation's second largest rail center.

**Truck Transportation & Highways**—The St. Louis Metropolitan area is the second largest trucking center in the country with more than 300 common carriers and 50 contract carriers. Most principal motor carrier lines serve the site. St. Louis is the crossroads for three interstate highways—I 70, I 55, I 44. The interstate circumferential system (I 270) forms the southern boundary of the site area.

**Air**—Lambert St. Louis Municipal Airport is 16 miles from the site, directly accessible via I 270. The St. Louis field is an international port of entry and is served by seven commercial airlines. Two Secondary airports—Bi-State Parks Airport (12 miles south), and Alton Civic Memorial Airport (7 miles north)—provide paved, lighted runways, FAA radio facilities, fuel and services for private and executive aircraft.

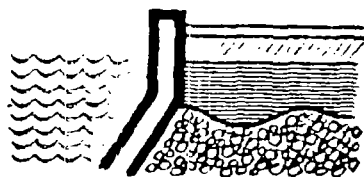




**Water Transportation**—St. Louis is one of the largest inland river ports in the nation. The Chain of Rocks Canal forms the western boundary of the industrial area and provides a minimum depth of 18 feet during low water periods. The Granite City harbor, 5 miles south of the site, operates year-round services to all shippers on the inland waterway system and provides direct connections to foreign markets by way of Chicago and New Orleans.

Two public docks operate on the canal with port facilities at the Granite City harbor—The Bi-State Development Agency, and the Tri-Cities Regional Port District. The harbor is served by the Illinois Terminal Railroad which serves the site area. In addition, a harbor at the northern sector of the canal is in the design and engineering stage by the Tri-Cities Port District.

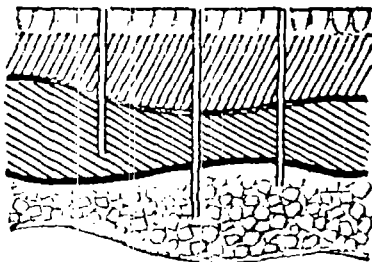
#### FLOOD PROTECTION:



The entire area is protected against flooding from the Mississippi River by an extensive network of levees built to the industrial standards of the U. S. Army Corps of Engineers. These levees are designed to contain a discharge on the Mississippi River of 1,300,000 cubic feet per second, equivalent to the flow which occurred on June 28, 1844—the highest flow of record and equal to a 200-year flood.

**Interior Drainage**—The entire area is within the Chouteau, Nameoki and Venice Drainage and Levee District. The district maintains a system of ditches for interior drainage and operates a pumping station on the canal.

#### FOUNDATION CONDITIONS:



A test boring program was conducted in the site area in 1964 by Horner & Shifrin, Consulting Engineers. Twenty holes were drilled to depths of 30' to 60' below the existing ground line. Laboratory tests and standard field penetration tests performed indicate the area, in general, is composed of medium to soft, fine grained material overlying medium density sands.

The upper fine grained soils indicate a safe bearing value of 2000 to 2700 lbs./sq. ft. Any load carried on the silts and clays can be safely supported on the underlying sand which can support footing loads in the neighborhood of 4000 lbs./sq. ft. Average thickness of the overlying clays and silts varies from 12 feet near the center of the property to about 30 feet near the north boundary.

Heavy concentrated loads which cannot be supported on spread footings can be supported on friction piles driven through the clays and silts into the underlying sands. These friction piles would be relatively short length and are commonly used throughout the Chain of Rocks area. Bearing piles to the underlying rock might also be used to support unusually heavy loads. Such piles would be in excess of 100 feet.

#### TRI-CITIES REGIONAL

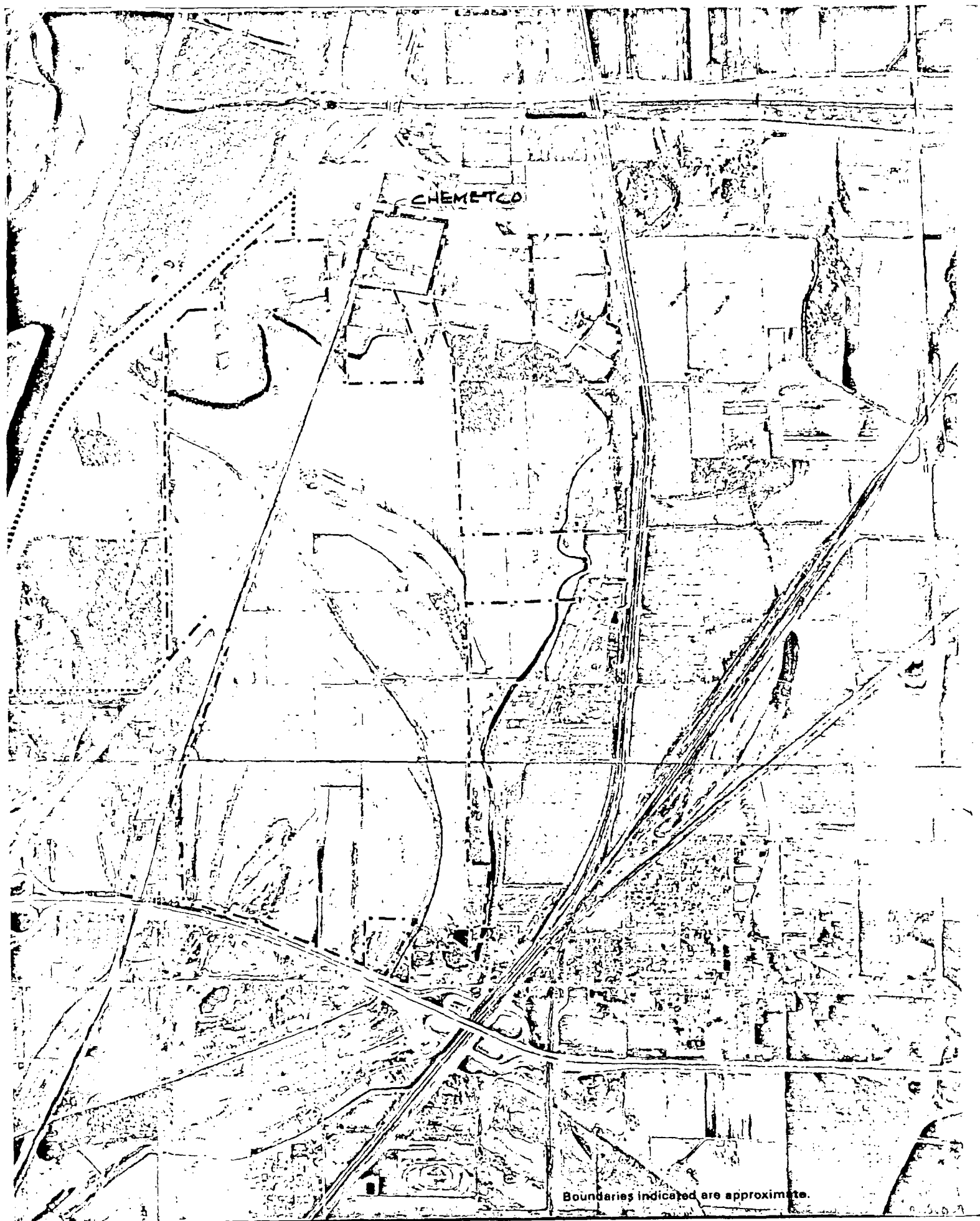
#### PORT DISTRICT:



This industrial area is included within the Tri-Cities Regional Port District. The Port District, a municipality, is authorized to build and operate port facilities in the area, as well as related functions such as tank farms, warehouses, etc. The Port District builds facilities including warehousing, shipping, etc. to accommodate any special features a shipper in the area might need or desire. The Port District is authorized to finance such developments with Municipal Revenue Bonds.

#### OWNERSHIP:

The site area outlined herein is owned by Union Electric. It is our intention to preserve the area for large industrial sites and assure its development in a logical and orderly fashion. The development potential of the area is substantiated in an engineering study prepared by Horner & Shifrin, Consulting Engineers.



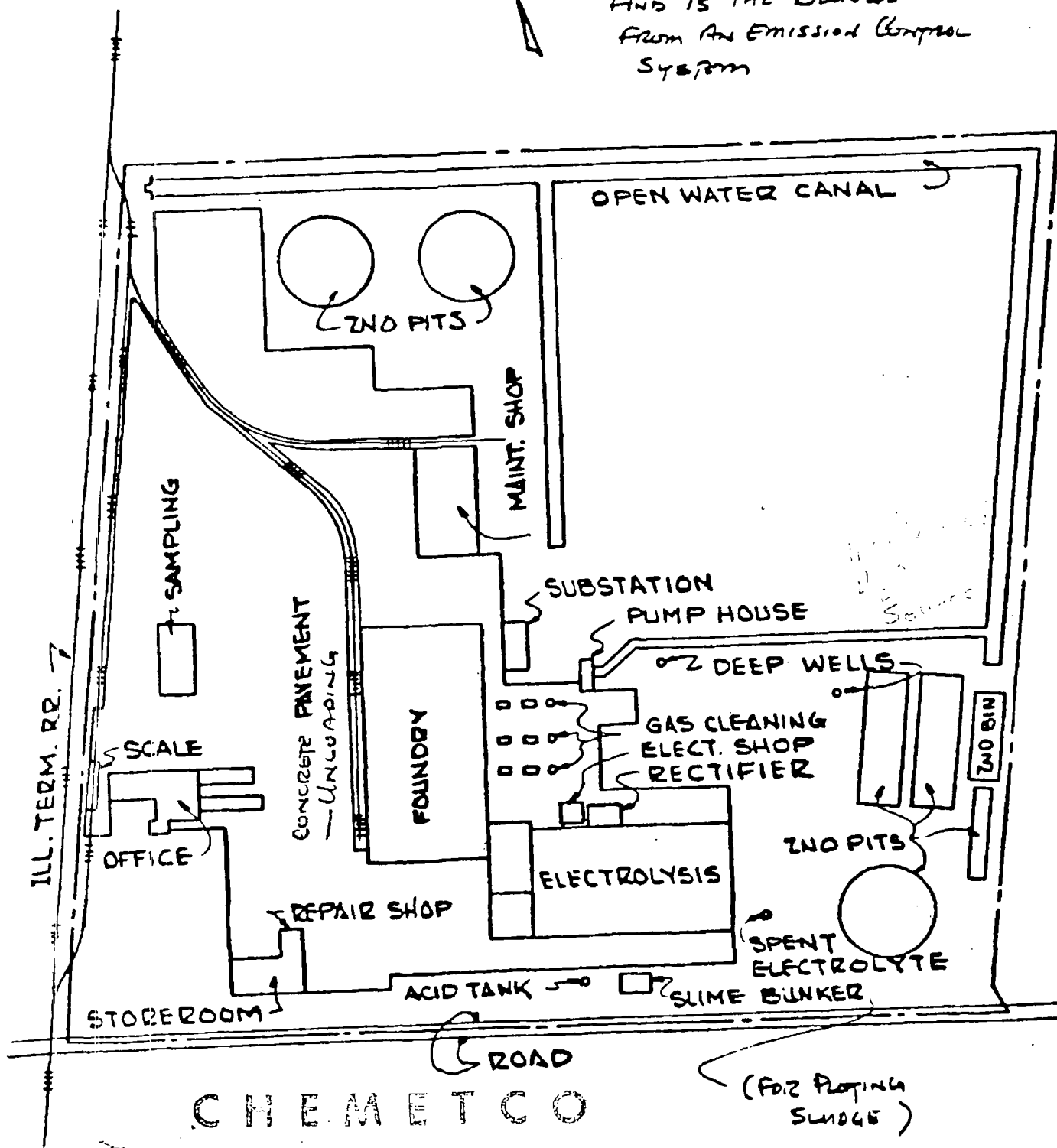
CHEMETCO

Boundaries indicated are approximate.

FACILITY DRAWING (see page 4)

NOTE:

"ZND" IS IN CRUVE FORM  
AND IS THE SLOUGH  
FROM AN EMISSION CONTROL  
SYSTEM



PRESENT SITE PLAN  
SCALE - 1" = 200'

EXHIBIT 4

SCREENED BF

8-10-7d

Now -

Woodward-Clyde Master & Associates

1350 Baur

St. Louis, Mo. 63132

Bill Prosser

SUBSURFACE INVESTIGATION

CHEMICO METALS CORPORATION

LEWIS & CLARK INDUSTRIAL AREA

ILLINOIS

CHEMETCO

EXHIBIT 6

by

WOODWARD-CLYDE & ASSOCIATES  
10272 Bach Boulevard  
St. Louis Missouri

RECEIVED

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STATE OF ILLINOIS

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CONSTRUCTION DETAILS	7

## EXHIBITS

SUMMARY OF LABORATORY TEST DATA	Table 1
BORING LOG: LEGEND AND NOMENCLATURE	Figure A-2
BORING LOCATION PLAN	Figure 1
BORING LOGS	Figures 2-12

# WOODWARD - CLYDE & ASSOCIATES

TELEPHONE MA. 6-0232

*Consulting Soil and Foundation Engineers*

10272 DACH BOULEVARD • OVERLAND •

ST. LOUIS, MISSOURI 63132

August 18, 1969

OAKLAND, CALIF.  
DENVER, COLO.  
OMAHA, NEB.  
KANSAS CITY, MO.  
PHILADELPHIA, PA.  
CLIFTON, N.J.  
ST. LOUIS, MO.  
SAN DIEGO, CALIF.  
SAN JOSE, CALIF.

NEW YORK, N.Y.

Chemico Metals Corporation  
P.O. Box 187  
Alton, Illinois 62002

Attn: Mr. Earl L. Bockstruck,  
President

## SUBSURFACE INVESTIGATION

## CHEMICO METALS CORPORATION

## LEWIS & CLARK INDUSTRIAL AREA

## ILLINOIS

Gentlemen:

We are transmitting herewith our report of the preliminary subsurface investigation for the proposed foundry building, to be constructed in the Lewis and Clark Industrial area in Madison, County, Illinois. This study was made in accordance with our proposal of July 11, 1969, following receipt of your letter of authorization dated July 21, 1969.

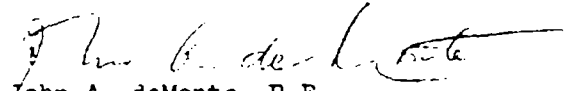
We believe it is important to mention at this time, that the subsurface conditions and foundation recommendations made in this report apply only to the area of the proposed foundry building, and not to other proposed adjacent building areas. It is considered essential that we be notified if the position of the foundry building on the site

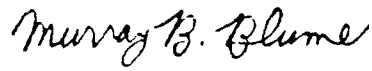
is altered.

In the event that your organization desires any additional information concerning this report, please feel free to contact us at your convenience.

Very truly yours,

WOODWARD-CLYDE & ASSOCIATES

  
John A. deMonte, P.E.

  
Murray B. Blume, P.E.

JAdM/mw  
Enclosure

## SCOPE

This report describes a preliminary subsurface investigation for the proposed foundry building of the Chemico Metals Corporation to be constructed at the Lewis and Clark Industrial area in Madison County, Illinois. The building site is located on a forty-two acre lot, north of highway 270 and south of the Chain of Rocks canal. It is bordered on the west side by Illinois Highway 3. The purpose of this preliminary study is to define the general conditions of the subsoils and groundwater and to provide subsurface information for determining the possible types of foundations that may be considered for building construction. It is also intended to discuss general problems affecting design and construction, due to the subsurface conditions.

## FIELD INVESTIGATION

The field investigation was set up as an exploratory program and consisted of three borings drilled during the period July 29 through July 31, 1969, under the supervision of a geologist. Two of the borings were drilled to a depth of 100 feet and the third to 75 feet. The positions of the borings were determined on the site with the assistance of Mr. Earl L. Bockstruck, President, Chemico Metals Corporation. They were located by referring to the property line and fence on the west side and the center line of the oil surface roadway to the south.

The borings were advanced with a 4-inch diameter, continuous flight auger, to depths of about 60 feet. Beyond these depths soundings were made by driving a 2-inch diameter cone continuously with a

140 pound hammer falling 30 inches and recording the number of blows per foot of penetration. Soil samples were recovered by driving a 2-inch internal diameter California liner tube sampler into the soil or by the Standard Penetration test. The samplers were also driven with a 140 pound hammer falling 30 inches. The number of blows required for each 6 inch penetration of the sampler was recorded on the boring logs. Undisturbed soil samples were obtained by pushing 3 inch diameter Shelby tubes into the soil. Auger cuttings of the soils were examined continuously during the course of drilling. The level at which free water entered the borings and the water level after 24 hours were noted. A boring location plan and the logs of the borings are shown in Figures 1-12.

#### LABORATORY TESTS

Laboratory tests on the soil samples provided information on the character and composition of the foundation soils. These included unconfined compression tests, water content, dry density, Atterberg limits, and a consolidation test for settlement estimates. Results of the tests are summarized on the attached table.

#### SITE AND SUBSURFACE CONDITIONS

The site is essentially level, and occurs in the alluvial flood plain near the confluence of the Missouri and Mississippi Rivers.

Underlying 18 to 20 inches of a plowed wheat topsoil, consisting of black highly plastic silty clay, boring information reveals

a 5 to 7 foot thick layer of stiff brown sandy silty clay. It is followed by about 10 feet of saturated loose to very loose sandy clayey silt or silty fine sand with occasional thin layers of highly plastic clay. At a depth of about 18 feet, firm to stiff blue-gray highly plastic clay, containing thin sand and silt zones is observed. This stratum continues to depths of 54, 49, and 40 feet in borings 1, 2, and 3 respectively. Medium dense clean uniform medium sand is next encountered; this becomes coarser and shows traces of gravel with increasing depth. In boring 3, the sand formation was overlaid by a 10 foot thick loose silt stratum containing clay and sand. At a depth of between 72 and 74 feet, dense fine to coarse sand with gravel is found. The dense sand stratum continues to the maximum depth studied.

#### ENGINEERING ANALYSIS

The alluvial soils show a deep formation of cohesive materials containing mostly silt and clay fractions to depths of between approximately 40 and 55 feet. These soils are all highly compressible, particularly the interlayered system of the upper 18 feet, containing soft to stiff and loose materials. The application of even light building loads on this type of soil subgrade will cause consolidation of the compressible alluvium, resulting in significant building settlements. Consolidation would be non-uniform in time and location due to the variability of soil strata, causing differential building movements. The settlement problem

can be eliminated by unloading the subgrade with excavation of upper material, or by preloading the site with a surcharge fill, or by the use of driven piles founded within the underlying dense sand formation. Due to high groundwater and unstable soils, subgrade excavation beyond shallow depths and drilled pier installations would encounter serious problems of dewatering and unstable soils. A prolonged time would be required for preloading the site, because of the low permeability of the highly plastic clay and the slow rate of consolidation that would occur in this thick stratum.

Several types of piles can be considered, although low displacement piles are preferred if a substantial number of large pile clusters are to be driven. Some advantages of low displacement piles would be easier driving, less influence on adjacent piles already driven, reduced soil displacements and ground heave, and a lower tendency towards uplift of previously driven piles. Pile types such as pre-cast concrete, concrete filled steel pipe, cast-in-place concrete in steel shells, and steel H sections can be installed for design capacities in the range of 40 to 80 tons or more. Pile lengths are expected to be in the range of 60 to 75 feet or longer. They will vary due to differing subsoils and will depend on the type of pile selected and the method and equipment used for driving. Specific pile details and driving conditions can be evaluated when details of the structure and foundation loads have been determined.

Limited support is available for area loads, such as floor slabs-on-grade and pavements, due to the high compressibility of the cohesive soils and related settlement. Areas receiving a few feet of new fill placement or heavy floor loadings could result in significant settlements, unless supported on piles. Floor slabs-on-grade should be separated from structural members supported on piles.

#### CONCLUSIONS AND RECOMMENDATIONS

1. The site has alluvial subsoils which show a deep formation of compressible cohesive materials, containing variable fractions of silt and clay, to depths of between approximately 40 and 55 feet. The upper 18 feet of soils have an interlayered system of soft and loose materials, followed by highly plastic clays. Underlying the clay strata there are medium dense sands which become more dense and gravelly with increasing depth.
2. The application of even light building loads will cause consolidation of the alluvial clays, resulting in significant building settlements. Non-uniform consolidation due to the variable subsoils could lead to serious differential movements.
3. The settlement problem can best be solved by driven piles founded within the underlying medium to dense sand formation. Pile types such as pre-cast concrete, concrete filled steel pipe, cast-in-place concrete in steel shells, and steel H-sections can be considered for design capacities of between 40 and 80 tons or more.

Pile lengths will vary substantially, probably between 60 and 80 feet, depending on the type of pile and conditions of driving. Specific pile details including uplift capacities and methods of driving can be evaluated after details of the structure and foundation loads have been finalized.

4. Subgrade excavations beyond shallow depths, including drilled pier excavations, would be faced with severe problems of dewatering and unstable soils. A prolonged duration of site preloading would be required for adequate stabilization of the deep clay subgrade.

5. The upper compressible soils will not support heavy floor loads or areas with several feet of fill placement without significant settlement. Floor slabs supporting moderate to heavy sustained loads, such as from large equipment, should be constructed on piles. More lightly loaded floor slabs on grade should anticipate settlement and be provided with moveable joints at intersections with walls and other structural members supported on piles.

6. This report describes general subsurface conditions and preliminary foundation recommendations that apply only to the presently selected area of the foundry building. Other proposed adjacent building areas may reveal different subsoil conditions and should be separately investigated. It is essential that we be notified if the position of the foundry building is altered on the site.

7. It is recommended that a conference with our organization precede final design of all facilities.

#### CONSTRUCTION DETAILS

Often during the preparation of the detailed drawings and design, questions arise concerning our report. Because of special mechanical or structural details, sometimes it is necessary to deviate from our recommendations. These problems can usually be reconciled easily by a brief conference between us and the designing architects and engineers.

In any foundation investigation it is necessary to assume that the subsoil conditions will not change very much between exploratory holes. The holes are spaced as closely as it is economically feasible in order to decrease the possibility of anomalies. For this reason, it is frequently advisable that the soil engineer inspect the exposed foundation excavations, especially if any unforeseen conditions are uncovered. We suggest that our firm be notified if any unexpected or suspicious appearing soils are encountered during construction.

## BORING LOG

### LEGEND AND NOMENCLATURE

Items shown on boring logs refer to the following:

1. Depth - Depth below reference elevations, usually ground surface unless otherwise shown.
2. Sample: Types are designated by letter:
  - D - Disturbed samples, obtained from auger cuttings or wash water for classification purposes only.
  - S - Split-Spoon sample, obtained by driving 2-inch split-spoon to determine penetration resistance and allow classification.
  - C - California liner-sampler obtained by penetration of thick, solid-wall sampler containing 2-inch liner-tubes, generally partially disturbed but suitable for laboratory testing of routine character.
  - U - Undisturbed sample obtained by penetration of minimum 3 inch diameter, thin-wall tube using an open or, where indicated, fixed-piston sampling head, sample suitable for laboratory testing of any type necessary.
- Rec - Recovery length is expressed as a percentage of the sampler length of soil penetration, or the measured length.
- Resist - Resistance is designated as follows:
  - P - Sample pushed in one continuous movement by hydraulic rig action, maximum hydraulic pressure shown where pertinent. Numbers indicate blows of a 140 pound hammer falling freely 30 inches and recorded per 6 inches of sampler penetration. The Standard Penetration Resistance is the number of blows for the last 12-inch penetrations, of the split-spoon sampler.
3. Description - Description of material according to the Unified Soil Classification system: word description gives soil constituents, consistency or relative density, and other appropriate classification characteristics, Unified Classification symbol shown on "Stratification log" column, or geologic names where appropriate.
4. Special Notes and Field Observations - Pertinent observations made by Inspector during drilling including type of boring, free water level, water seepage, fluid loss, hole termination depth, etc.

Figure A-2

TABLE

## SUMMARY OF LABORATORY TEST DATA

CHEMICO

File S-69-12

WOODWARD-CLYDE AND ASSOCIATES

600 EAST 95TH STREET

KANSAS CITY 31, MO.

Boring or Test Pit and Sample Depth - Ft.	Unified Soil Classification Symbol	Classification Properties						Physical Properties								
		Natural Water Content - Avg. %	Liquid Limit %	Plastic Limit %	Water Content Limit Sample %	Grain Size Distribution - Figure	Dry Unit Weight Pounds Cubic Foot	Compressive Strength						Volume Change		
								Unconfined			Triaxial			Volume Change Data See Figure	Existing Overburden Stress Kips/Sq. Ft.	Estimated Preconsolidation Stress Kips/Sq. Ft.
								Compressive Strength Kips/Sq. Ft.	Water Content at End of Test, %	Strain at Failure %	Type of Test	Deviator Stress Maximum ( $\sigma_1$ or $\sigma_3$ )	Confining Pressure ( $\sigma_2$ or $\sigma_3$ ) psi	Water Content Start - End %	Saturation Start - End %	
B-1																
3'	CH	30	51	17	30.4		91									
8'	CL	31					90									
18'	CH	46					75									
33'	CH	46					71									
43'	CH	62					62									
53'	CH	61					63									
B-2																
3'	CL	32					89									
8'	CL	30	40	20	29.3		93									
18'	CH	47					74									
24'	CH	62					63									
29'	CH	60					65	2.3	59.8	1						
38'	CH	54					67									
B-3																
3'	CL	25					98									
24'	CH	67	112	26	67.4		60	1.2	66.5	5				*		
33'	SM-CL	31	35	20	35.1		89									

TABLE

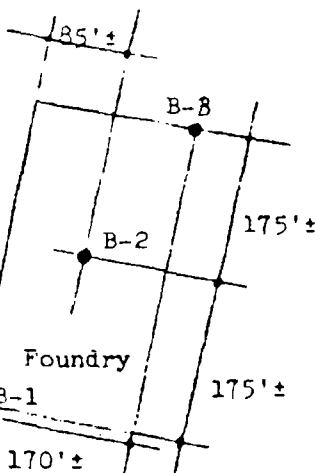
CHEMETCO

North

SCALE - 1" = 200'

C/L  
F.A.I. 151

Fence-line  
Property-line



C/L Oiled  
Earth  
Surface

Existing  
Terminal  
Railroad Tracts

Existing Road

CHEMICO METALS COPORATION  
BORING LOCATION PLAN

WOODWARD-CLYDE & ASSOCIATES  
S-69- 12

FIGURE 1

## CHEMICO METALS CORPORATION

Sheet 1 of 4

Job S-69-12

Rig WC-CME

BORING NO.

1

Drilled J. Hamberg

Location

See plan

Elevation Datum



MSL

Surface

430±

Water

423± @ drilling &amp; 24 h

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
			Blows 6"	18-20" Plowed Wheat soil black, silty to highly plastic		Hole advanced w/ 4" diameter C.F.A.
	C	8" 12"	6 8	Stiff, brown, slightly sandy, slightly silty CLAY	CL CH	
5				Grading to		Water enters @ 7.0' 24 hr. Water Level = 7.0' 
	C	10" 12"	3 12"	Soft, brown, saturated, slightly sandy clayey SILT	ML SM	
10						
	SS	16" 18"	3 4 5	Loose, brown, saturated, slightly silty, uniform, fine SAND	SM SP	 Perched Water
15						
	C	10" 12"	6 6	Stiff, bluish-gray, highly plastic CLAY	CH	---Lacustrine
20						
	C	10" 12"	2 3			

## CONTRACT ITEMS

Soil Rock

Inspector W. Prosser

00.0'

Date July 29, 1969

WOODWARD-CLYDE &amp; ASSOC

FIG. NO. 2

CHEMICO METALS CORPORATION

Sheet 2 of 4

Job S-69-12

Rig WC-CME

Project

Driller J. Hamberg

Location See plan

BORING NO. 1

Elevation Datum MSL Surface Same Water Same

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
30				DO	CH	---Lacustrine
35	C	$\frac{10''}{12''}$	$\frac{3}{4}$	Firm, bluish-gray, slightly silty CLAY		
40						
45	C	$\frac{10''}{12''}$	$\frac{3}{4}$	DO		

CONTRACT ITEMS

Soil Rock  
100.0'

Inspector W. Prosser

Date July 29, 1969

JODWARD-CLYDE & ASSOC SSOC

FIG. NO. 3

F I

CHEMICO METALS CORPORATION

Sheet 3 of 4

Project

Job S-69-12

Driller J. Hamberg

Log WC-CME

BORING NO. 1

Location See plan

Elevation Datum MSL Surface Same Water Same

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
	C	10" 12"	3 7		CH	
55	SS	16" 18"	7 8 13	Medium dense, gray, clean, uniform medium SAND	SP	---Alluvium
						Stop auger
65	SS	18"	12 8 11	Medium dense, gray, clean, uniform, medium SAND w/ some coarse SAND w/ individual gravel layers	SP	
70	SS		10 15 20	Dense SAND	SP	Re-start w/ auger unable to seal off gravel zones

CONTRACT ITEMS

Inspector W. Prosser

Date July 29, 1969

FIG. NO. 4

Soil Rock

SOOD AND CLYDE & ASSOC

SSOC

Fig. WC-CME

Project

Driller J. Hamberg

Location See plan

WORKING NO. 1

Elevation Datum MSL Surface Same Water Same

[illegible]

Soil      Rock

010.0

STEWART-CLYDE & ASSOC

SSOC

Inspector W. Prosser

Date July 29, 1969

FIG. NO. 5

## CHEMICO METALS CORPORATION

Sheet 1 of 3

Job 8-69-12


Rig WC-CME

BORING NO. 2

Driller J. Hamberg

Location See plan

Elevation Datum MSL Surface 430± Water 423± @ 24 hrs.  
423± @ drilling

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
			Blows 6"	20" Plowed wheat field, black highly plastic CLAY	CH	Hole advanced w/ 4" diameter C.F.A.
	C	10" 12"	6 8	Stiff, brown, slightly, sandy silty CLAY	CL	
5						24 Hr. Water Level = 7.0' 
	C	12"	2 4	Soft, brown, slightly sandy, clayey SILT moist to wet	ML	
10				DO; saturated	SM ML	
15				Very loose, saturated, silty, fine SAND w/ thin bluish-gray layers	SM	
	C	12"	3 4	Firm, bluish-gray, highly plastic CLAY	CH	
20						---Lacustrine

## CONTRACT ITEMS

Soil Rock  
12.0'

WOODWARD-CLYDE &amp; ASSOC

F-1

Inspector W. Prosser

Date July 30, 1969

FIG. NO. 6

Sheet 2 of 3

100 S-69-12

RIR ~~WC CME~~

Duller J. Hamberg

Location See plan

DRILLING NO. 2

levation Datum MSL Surface Same Water Same

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
					CH	
	3" Dia.	24"	P	Stiff, bluish-gray, highly plastic CLAY	CH	Lacustrine
S.T.						
30						
	C	10" 12"	3 4	Firm, bluish-gray, highly plastic CLAY	CH	
35						
40						
	C	10" 12"	2 3	DO; w/ silty zones		↓ Probe w/ augers
45						
					SP	↑ Unable to probe w/augers ---Alluvium

### CONTRACT ITEMS

Inspector W. Prosser

Date July 30, 1969

Date \_\_\_\_\_

FIG. NO. 7

App. 1

102 8-69-12

R/R WC-CME

JURING NO. 2

Dubler J. Hamberg

Location \_\_\_\_\_ See plan \_\_\_\_\_

evation Datum MSL Surface Same Water Same

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
	SS	$\frac{12''}{18''}$	6 10 12	Medium dense, clean, uniform, medium SAND	SP	
55						
60						
65						
			Blows			
			1"			
			24			
			24			
70			25			
			31			
			33			
			42	Dense SAND		Hole advanced by continuously driving 2" dia. cone w/ a 140# hammer falling 30", noting blows/ft.
			55			Bottom of Hole = 75.0'

CONTRACT ITEMS

Inspector W. Prosser

Date July 30, 1969

FIG. NO. 8

## CHEMICO METALS CORPORATION

Sheet 1 of 4

Job. S-69-12

Rig. WC-CME

BORING NO. 3

Driller J. Hamberg

Location See plan

423± @ 24 hrs.

Elevation Datum

MSL

Surface

430±

Water

423± @ drilling

Depth	SAMPLE			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
			Blows 6"	20" Plowed wheat topsoil		Hole advanced w/ 4" diameter C.F.A.
	C	10" 12"	6 8	Stiff, brown, slightly, sandy, silty, CLAY	CL	Alluvium
5					ML	24 Hr. Water Level = 7.0'
	SS	16" 18"	2 3 3	Very loose, to loose, brown, silty, fine saturated SAND	SM	Water enters @ 7.0'
10						
	SS	16" 18"	3 3 3	Stiff, brown, highly plastic, slightly sandy, CLAY	CH	
15				Very loose, silty, fine, saturated, SAND	SM	
	SS	16" 18"	2 4 4	Firm, bluish-gray, highly plastic CLAY	CH	
20						
	3" Dia.					
	S. T.	24" 24"	P	DO; w/ thin sand & silt zones	CH SM	

## CONTRACT ITEMS:

Soil Rock  
100.0'

Inspector W. Prosser

Date July 31, 1969

WOODWARD-CLYDE &amp; ASSOC

FIG. NO. 9

Project CHEMICO METALS CORPORATION Sheet 2 of 4  
 Driller J. Harberg Job S-69-12  
 Location See plan Rig WC-CME

Elevation Datum MSL Surface Same Water Same

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
0					CH SM	
35	C	10" 12"	3 3	Loose, bluish-gray, clayey sandy SILT	SM ML	
45	SS	16" 18"	8 10 15	Medium dense, gray, clean, uniform, medium SAND	SP	

CONTRACT ITEMS

Soil Rock  
 00.0'

Inspector W. Prosser

Date July 31, 1969

JODWARD-CLYDE & ASSOC SSOC

FIG. NO 10

Same

[illegible]

FIG. NO. \_\_\_\_\_ 11

Project CHEMICO METALS CORPORATIONSheet 4 of 4Job S-69-12Driller J. HambergRig WC-CMEBoring No 3Location See planElevation Datum MSL Surface Same Water Same

Depth	S A M P L E			Description	Stratification Log	Special Notes Field Observations
	Type	Rec	Resist			
			70	Dense, gray, clean, fine to coarse SAND w/ gravel	SP GP	
			66			
			60			
			67			
			65			
80			70	Gravel zone		
			105			
			52	DO; dense SAND, w/ some gravel, less than 1" in size		
			59			
			59			
85			65			
			70			
			65			
			80			
90			60			
			60			
			78			
			87			
			109			
95			93			
			97			
			85			
			85			
			87			
			89			

Bottom of Hole = 100.0'

## CONTRACT ITEMS

Soil Rock

100.0'

Inspector W. ProserDate July 31, 1969

OODARD-CLYDE &amp; ASSOC

SSOC

FIG. NO. 12

(31.5 Therms per  
DAILY AVE.)

Aug. 80 (Final)

DATE 9-2-80

(GAS) MONTH + YEAR → (Aug - 80)  
DAYS → (31)

(PLANT TOTAL)

31 DAYS = 42,900,000 (ft<sup>3</sup>)

1 DAY (AVE.) = 1,383,870 (" )

PROJ. 31 DAYS = 42,900,000 (" )

" 31 DAYS = 429,000 (Therms)

(BOILER) (18.3 %)

31 DAYS = 7,869,000 (ft<sup>3</sup>)

1 DAY (AVE.) = 253,838 (" )

PROJ. 31 DAYS = 7,869,000 (" )

" 31 DAYS = 78,690 (Therms)

RECEIVED (HOLDING TCE) (16.4 %)

NOV 19 1980

E.P.A. -- D.L.P.C.  
STATE OF ILLINOIS

31 DAYS = 7,033,850 (ft<sup>3</sup>)

1 DAY (AVE.) = 226,898 (" )

PROJ. 31 DAYS = 7,033,850 (" )

" 31 DAYS = 70,339 (Therms)

(TUYERS) (2.6 %)

31 DAYS = 1,130,460 (ft<sup>3</sup>)

1 DAY (AVE.) = 36,466 (" )

PROJ. 31 DAYS = 1,130,460 (" )

" 31 DAYS = 11,305 (Therms)

SCREENED BF *fw*

3312  
Therme from  
DAILY AVE

Aug 80 FINAL DATE 9-2-80

(O<sub>2</sub>)

MONTH x YEAR (Aug - 80)

DAYS → ( 31 )

$$34,196,100 + 361,900$$

$$(\text{STANDARD}) + (\text{LOK}) = 34,558,000$$

$$31 \text{ DAYS} = 34,558,000 \text{ (ft}^3\text{)}$$

$$1 \text{ DAY} = 1,114,774 \text{ ( " )}$$

PROJ. 31 DAYS = 34,558,000 ( " )

" 31 DAYS = 345,580 (Therms)

CHEMETCO

(PREMIUM) (14.7 %) (OF STD.)

$$31 \text{ DAYS} = 5,035,450 \text{ (ft}^3\text{)}$$

$$1 \text{ DAY} = 162,434 \text{ ( " )}$$

PROJ. 31 DAYS = 5,035,450 ( " )

$$31 \text{ DAYS} = 50,355 \text{ (Therms)}$$

(MISC)

$$\text{LOK} = 361,900 \text{ (ft}^3\text{)}$$

(ft<sup>3</sup>)

Chemetsco (Totalizer)	39,258,390 (113.6%)
Airco (Std + LOK)	34,558,000
(Diff)	4,700,390

Lw

(36.0 Therms per  
DAILY AVE.)

June 80 Final

DATE 6-30-80

(GAS) MONTH + YEAR → (6-80)  
DAYS → (30)

(PLANT TOTAL)

	30 DAYS	=	42,703,300	(ft <sup>3</sup> )
	1 DAY (AVE.)	=	1,423,443	( " )
PROJ.	30 DAYS	=	42,703,300	( " )
"	30 DAYS	=	427,033	(Therms)

(BOILER) (19.2 %)

	30 DAYS	=	8,206,800	(ft <sup>3</sup> )
	1 DAY (AVE.)	=	273,560	( " )
PROJ.	30 DAYS	=	8,206,800	( " )
"	30 DAYS	=	82,068	(Therms)

(HOLDING ICE) ( % )

	30 DAYS	=	6,881,330	(ft <sup>3</sup> )
	1 DAY (AVE.)	=	229,378	( " )
PROJ.	30 DAYS	=	6,881,330	( " )
"	30 DAYS	=	68,813	(Therms)

(TUYERS) ( % )

	30 DAYS	=	2,835,040	(ft <sup>3</sup> )
	1 DAY (AVE.)	=	94,501	( " )
PROJ.	30 DAYS	=	2,835,040	( " )
"	30 DAYS	=	28,350	(Therms)

kw

CHEMETCO

(38.1 Therms from DAILY AVE)

(JUNE 80, FINAL) DATE 6-30-80  
 MONTH x YEAR ( 6-80 )  
 DAYS → ( 30 )

$36,059,200 + 324,200$   
 (STANDARD) + (Lox) = 36,383,400

	30 DAYS	=	36,383,400	( $\delta t^3$ )
	1 DAY (AVE)	=	1,212,780	( " )
PROJ	30 DAYS	=	36,383,400	( " )
"	30 DAYS	=	363,834	(Therms)

CHEMETCO

(Premium) ( % ) (OF STD.)

	30 DAYS	=	6,066,300	( $\delta t^3$ )
	1 DAY (AVE)	=	202,210	( " )
PROJ	30 DAYS	=	6,066,300	( " )
"	30 DAYS	=	60,663	(Therms)

(MISC)

Lox 324,200  $\delta t^3$

TOTALIZER (CME) 37,211,430 ( $\delta t^3$ ) (102.3%)  
 STD + LOX (AREO) 36,383,400  
 (DIFF) → 828,030

Tw

FF 31

*gmk*

CHEMTECO

Gas (July 1980)

TUYER FACTOR (X 1.128)

DATE	MAIN	BOILER	PLANT TOTAL	#2 FCB	#1 FCB	#3 FCB	3 FCB TOTAL	H.F.	FDRY TON	BOILER	TONS	THRU TON
1	519.865	454625	1230000	238000	(DOWN)	247500	514000	292400	812400	376000	180	50.8
2	519.962	455050	970000	197300	( " )	253800	451100	252720	703820	255000	190	57.0
3	520.065	455485	1030000	191100	( " )	418500	609600	2550510	864650	261000	248	34.9
4	520.176	455805	11110000	358400	-	267200	625600	234600	999000	192000	278	35.0
5	-	-	-	-	-	-	-	-	9380	240	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-
7	520.548	457081	3720000	828000	673000	344000	1855000	529000	2812640	765600	853	32.0
8	520.666	457477	1180000	295000	4116000	-	471000	169000	941520	237600	207	30.7
9	520.777	457802	11110000	293000	341000	-	594000	226100	978020	195000	250	39.1
10	520.883	458091	1060000	199000	537000	-	536000	166300	803820	173900	314	25.6
11	521.027	458426	1440000	195700	318910	1143200	457830	203000	1061670	201000	264	40.5
12	-	-	(137M)	109100	185020	109100	6020	22100	9500	19100	-	-
13	-	-	-	224130	247800	261960	-	-	-	-	-	-
14	521.437	459381	4100000	222590	250180	194800	1804680	663400	2851600	573000	1034	27.6
15	521.571	459629	1340000	173900	323440	216170	713910	231210	1046840	128800	411	35.2
16	521.718	460010	1470000	389130	276020	214740	879890	201650	1183060	198600	439	28.8
17	521.850	460426	1320000	280570	320490	42310	643380	259500	1145890	242000	237	34.0
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-	-	-	-	-

DATE	PLANT TOTAL	AM	FDRY BOILER TUBES	#2 ACCT	HF TOTAL	#1	%	BOILER	#1	%	10 TONS	#1	%	10 TONS	10 TONS
1	1,230,000	1.23	1088400	1.09	298400	298	24.3	276,000	276	22.4	—	—	—	—	—
2	1,200,000	1.10	2047220	1.02	93,1	276	25.1	531,000	266	24.1	—	—	—	—	—
3	3,230,000	1.08	3,172,870	1.06	98.2	269	25.0	292,000	264	24.5	—	—	—	—	—
4	4,340,000	1.09	4,338,870	1.08	99.9	260	24.0	984,000	246	22.7	112880	—	—	—	—
5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6	8060,000	1.11	7917,110	1.13	98.2	224	19.5	1749,600	250	21.7	11110	—	—	—	424,640
7	8240,000	1.16	8,858,630	1.11	95.8	217	18.8	1987,200	248	21.5	67620	—	—	—	101,520
8	10,350,000	1.15	19,031,650	1.11	96.9	218	19.0	2,182,200	242	21.1	152420	—	—	—	67,680
9	11,410,000	1.14	11,008,870	1.10	96.5	213	18.8	2,351,600	236	20.6	101,520	—	—	—	152,920
10	12,859,000	1.17	12,278,540	1.12	95.6	219	18.8	2,556,600	232	19.9	—	—	—	—	101,520
11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14	16,910,000	1.21	15,703,140	1.12	92.6	220	18.2	3,139,600	224	18.5	133,600	97	8.0	954	373,520
15	18,290,000	1.22	16,928,580	1.13	92.6	221	18.1	3,318,400	221	18.1	141,100	97	7.9	963	10,470
16	19,760,000	1.24	18,310,240	1.14	92.7	219	17.8	3,517,000	220	17.8	156,400	97	7.9	972	101,520
17	21,080,000	1.24	19,705,680	1.16	93.4	221	17.9	3,766,600	222	17.9	169,800	106	8.6	994	242,160
18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

GAS  
July  
80

CHEMETCO

56,400

Gas (July 1980)

TUYER FACTOR (11.28)

DATE	MAIN	BOILER	PLANT TOTAL	#2 FCE	#1 FCE	#3 FCE	3 FCE TOTAL	H.F.	FDRY TOTAL	BOILER	TONS	TOTAL TON
1	519865	454625	1230000	238000	(DRAIN)	247500	514000	298400	812400	276000	180	50.8
2	519462	451050	970000	147300	( )	253800	451100	257220	703800	257220	180	37.0
3	520065	451485	1030000	191100	( )	418500	609600	255010	864650	261000	248	34.9
4	520176	455805	1111000	58400	( )	261200	645600	234600	974200	191000	278	35.0
5	—	—	—	—	—	—	—	—	—	—	—	—

# CHEMETCO

no  
trunk  
dip

2 (July 1980)

8	9	1	2	3	4	5	6	7	8	9	10	11	12
U.	STD.	PRE.	STD.	PRE.	% PRE.	TONS	TARE	#2 FCE	#1 FCE	#B FCE	STCE TOTAL	TOTAL EOC	
37990	1	686907	325350	716500	2000	160	44.8	492800	(20.1)	208600	607400	719250	(100)
38079	2	692549	375677	564200	32700	190	29.7	565100	(11)	253100	618900	707150	(82)
38079	3	701418	376480	886900	80300	248	35.8	556600	(11)	518100	1074700	861350	(97)
38079	4	710375	377180	895700	70000	278	32.2	7681000	-	345000	11113000	890000	(99)
5	-	-	-	-	-	-	-	-	-	-	-	-	5
6	-	-	-	-	-	-	-	-	-	-	-	-	6
38079	7	736697	378928	2632200	174800	853	30.9	1950000	312000	452000	26114000	3104500	(118)
38079	8	744658	379367	796100	43900	307	28.9	663000	352000	-	1015000	1048500	(132)
38079	9	752394	379833	773000	46600	250	30.9	631000	301000	-	938000	982000	(127)
38079	10	759945	380146	755100	31300	314	24.0	571000	371000	-	942000	1009000	(130)
38079	11	768457	380818	851200	67200	264	32.2	608100	334700	3920	946720	981200	(115)
12	-	-	-	(5.8)	(135)	-	-	446610	205600	146610	-	(130)	12
13	-	-	-	-	-	-	-	566870	556780	401690	-	-	13
14	714	793105	384868	2464800	408000	1084	23.8	553140	369390	294710	3241390	3904400	(134)
38079	15	799444	385628	633900	76000	411	23.9	628780	264100	502640	1195520	1312500	(136)
38079	16	806218	386859	627400	123100	439	25.2	489420	451210	493600	1434230	1559300	(138)
17	813131	387109	(691300)	139000	20.1	337	20.5	423550	294250	412400	1130290	1251200	(139)
18	-	-	-	-	-	-	-	-	-	-	-	-	18
19	-	-	-	-	-	-	-	-	-	-	-	-	19
20	-	-	-	-	-	-	-	-	-	-	-	-	20
21	-	-	-	-	-	-	-	-	-	-	-	-	21
22	-	-	-	-	-	-	-	-	-	-	-	-	22
23	-	-	-	-	-	-	-	-	-	-	-	-	23
24	-	-	-	-	-	-	-	-	-	-	-	-	24
25	-	-	-	-	-	-	-	-	-	-	-	-	25
26	-	-	-	-	-	-	-	-	-	-	-	-	26
27	-	-	-	-	-	-	-	-	-	-	-	-	27
28	-	-	-	-	-	-	-	-	-	-	-	-	28
29	-	-	-	-	-	-	-	-	-	-	-	-	29
30	-	-	-	-	-	-	-	-	-	-	-	-	30
31	-	-	-	-	-	-	-	-	-	-	-	-	31

02 July 80

DATE	STD.	STD x LOX	%	TOTALIZER	%	%	LOX (BL)	PRE.	%	%
1	716,500	716,500	.72	719,250	.72	100.9	—	2,000	2	2.8
2	1,280,700	1,280,700	.64	1,426,400	.71	111.4	—	34,700	17.4	2.7
3	2,167,600	2,259,500	.75	2,287,750	.76	106.7	82,900 *	115,000	38.3	5.3
4	3,063,300	3,144,200	.79	3,177,750	.79	101.0	—	185,000	46.2	6.0
5	—	—	—	—	—	—	—	—	—	—
6	—	—	—	—	—	—	—	—	—	—
7	5,695,500	5,778,400	.83	6,282,250	.90	108.7	—	354,800	51.4	6.3
8	6,491,600	6,574,500	.82	7,330,750	.92	111.5	—	407,700	50.5	6.2
9	7,265,200	7,348,100	.82	8,312,750	.92	113.1	—	459,300	50.0	6.2
10	8,020,300	8,103,200	.81	9,321,750	.93	115.0	—	481,600	48.2	6.0
11	8,871,500	8,954,400	.81	10,303,030	.94	114.9	—	548,800	48.9	6.2
12	—	—	—	—	—	—	—	—	—	—
13	—	—	—	—	—	—	—	—	—	—
14	11,336,300	11,419,200	.82	14,207,430	1.01	124.4	—	953,800	68.1	8.4
15	11,970,200	12,371,600	.82	15,519,930	1.03	126.4	318,500 *	1,029,800	68.7	8.6
16	12,647,600	13,477,900	.84	17,079,230	1.07	126.3	428,900 *	1,152,900	72.1	9.1
17	13,338,900	14,169,200	.83	18,338,430	1.08	129.4	—	1,291,900	76.0	9.7
18	—	—	—	—	—	—	—	—	—	—
19	—	—	—	—	—	—	—	—	—	—
20	—	—	—	—	—	—	—	—	—	—
21	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—
23	—	—	—	—	—	—	—	—	—	—
24	—	—	—	—	—	—	—	—	—	—
25	—	—	—	—	—	—	—	—	—	—
26	—	—	—	—	—	—	—	—	—	—
27	—	—	—	—	—	—	—	—	—	—
28	—	—	—	—	—	—	—	—	—	—
29	—	—	—	—	—	—	—	—	—	—
30	—	—	—	—	—	—	—	—	—	—
31	—	—	—	—	—	—	—	—	—	—

\*LOX 7.15.80 (P2,900)

\*LOX 7.15.80 (518,500)

\*LOX 7.15.80 (428,900)

7.17.80

Direct Ptd. Meter  
appears to be  
reading low &  
trending toward  
difficult to say  
if

02 (July 1980)

DATE	STD.	PRE.	STD.	PRE.	% PRE.	TONS	THERMS	#2 FCE	#1 FCE	#3 FCE	PRE TOTAL	TOTALIZER
379900 1	686,907	375,350	716,500	2,000	(2.8)	140	44.8	492,800	(20.4)	204,600	697,400	719,250
2	692,549	375,677	564,200	3,700	(2.8)	140	39.7	565,100	(1.1)	253,800	618,900	707,750
30774 3	701,418	376,480	816,900	803,00	(9.1)	248	35.8	556,600	(1.1)	518,100	1,074,700	861,550
38079 4	710,375	377,180	895,700	70,000	(7.8)	118	32.2	768,000	—	343,000	1,113,000	895,700
5	—	—	—	—	—	—	—	—	—	—	—	—
6	—	—	—	—	—	—	—	—	—	—	—	—

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NOV 19 1980

E.P.A. — D.L.P.C.  
STATE OF ILLINOIS

CHEMETCO

EXHIBIT 7

Chemetco is a major producer of high purity copper and certain other non-ferrous metals and alloys derived for the most part from recyclable materials (scraps and residues).

The company originated June 9, 1969, as an Illinois corporation, Chemico Metals Corporation, and was merged into a Delaware corporation of the same name March 23, 1970. Modern administrative and manufacturing facilities located near the small town of Hartford, Illinois, in the northern segment of the St. Louis (Mo.-Ill.) metropolitan area were under construction for two years.

Utilizing a unique and proprietary pyrometallurgical and electrolytic process, the company began production of copper in cathode form in March, 1972, and the next year changed its name to Chemetco. It now employs approximately 200 persons.

While Chemetco has capabilities for producing copper cathodes from copper oxide ores or precipitates, its major function is the recycling, or secondary processing, of copper-bearing scrap and manufacturing residues. The operation entails purchasing raw materials from throughout the United States and Canada and sales of finished products in those two countries and Europe.

Purchases from a wide variety of sources and sales to merchants, brokers, and consumers are based on Commodities Exchange (Comex) price quotations. Chemetco's "CME" copper cathode is registered on both Comex (New York) and the London Metal Exchange (C.M.E.).

Virtually every Chemetco operation, from trading transactions to safety performance and inventories, is computer-programmed and monitored for optimal efficiency.

Copper-bearing raw materials arrive at the 41-acre Chemetco site by truck, rail, and barge from hundreds of sources and locations. Much of it has originated in electrical or electronic equipment or cable, but a certain percentage is composed of such items as skimmings, slags, turnings, grindings, and other residues from foundries and factories, auto parts and building components.

Each lot is weighed, then held separately on concrete pavement until a careful analysis of samplings has been completed and settlements based on the results are made with the seller. Copper and other metallic contents are determined precisely by chemical, spectrographic and other means in the analytical laboratory.

Chemetco's three 70-ton gas-fired furnaces and electrolytic cell facilities have a capacity of 40,000 tons of copper cathodes per year. The furnaces are among the most capable in the industry as to the variety of raw materials handled, and at the same time are believed to be the most fuel-efficient.

A premix consisting of the copper-bearing raw material and other ingredients is smelted in one of the furnaces in the first step of the process, producing black copper (containing small amounts of lead, tin and zinc). The black copper

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CHEMETCO

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is further refined in the same type furnace utilizing blown oxygen, producing 99 per cent copper along with zinc oxide and a refining slag that is rich in lead and tin and contains some nickel.

The zinc oxide is extracted from furnace flue gases by a highly efficient pollution-control scrubber system which simultaneously cleans the gases. (The Chemetco plant is in compliance with all the standards of the Illinois Environmental Protection Agency.)

The slag itself is then refined in one of the furnaces producing black copper that is fed back to the second-stage furnace plus lead and tin extracted as a wrought solder alloy.

Copper emerging from the black copper refining step at Chemetco already is 99 per cent pure; it is transferred to the anode furnace, from which it is cast in molds.

The resulting 740-pound anodes are transferred mechanically to the electrolytic refining department. Immersed in the chemical bath of the electrolytic cells, they sacrifice their copper content to the gradually growing cathodes which become the highly purified primary product of Chemetco.

As the copper ions migrate from anode to cathode during the electrolytic process, the impurities settle to the bottom of the cell tanks. The material is retrieved, filtered, packed and shipped to refiners of those metals.

In a patented, proprietary process unlike any other operating presently in the United States, 99 per cent pure copper anodes are transformed into 99.98 per cent pure cathodes in Chemetco's expansive electrolytic cell room.

Process water for the electrolyte is filtered and purified in the company's own system. High-voltage alternating current from utility power lines is converted by solid-state rectifiers to the high-density reverse direct current necessary for cell operation.

The combined Chemetco copper smelting and electrolytic refining systems resulted from 15 years of intensive research and development. The over-all process has the flexibility needed to treat economically the broadest range of copper-bearing materials and efficiencies of both fuel consumption and output selectivity enabling it to operate with minimum loss of copper and to attain maximum recovery of other useful products.

Very little "waste" accrues from the Chemetco recycling operation. Even slag, transported in molten form to storage areas, is later graded and screened, becoming a useful material for thermal insulation, sandblasting aggregate, road-bed fill and other applications.

The slag thus becomes a Chemetco end product along with high-purity copper cathodes, solder alloy, zinc oxide, copper and nickel sulphates. In addition, some copper anodes and alloys are sold.

When  
where  
how?

CHEMETCO

~~SECRET~~

EXHIBIT 7

- 3 -

Chemetco's central geographic location, just 20 minutes from downtown St. Louis or Lambert St. Louis International Airport, is unexcelled for convenient transportation.

Even more importantly, access to shipping facilities is outstanding. The Illinois Terminal Railroad traverses the site and connects with 18 trunkline railroads serving the area. Year-round shipping via the inland waterways with access to foreign ports by way of Great Lakes or Gulf is available through two Mississippi River ports within five miles of the plant. Finally, Chemetco is located near four interstate highways and St. Louis' 300 common carriers.

CHEMETCO

TOWNSHIP 4-N RANGE 9-10-W.

County of Township Roads  
Railroads

CHOUTEAU

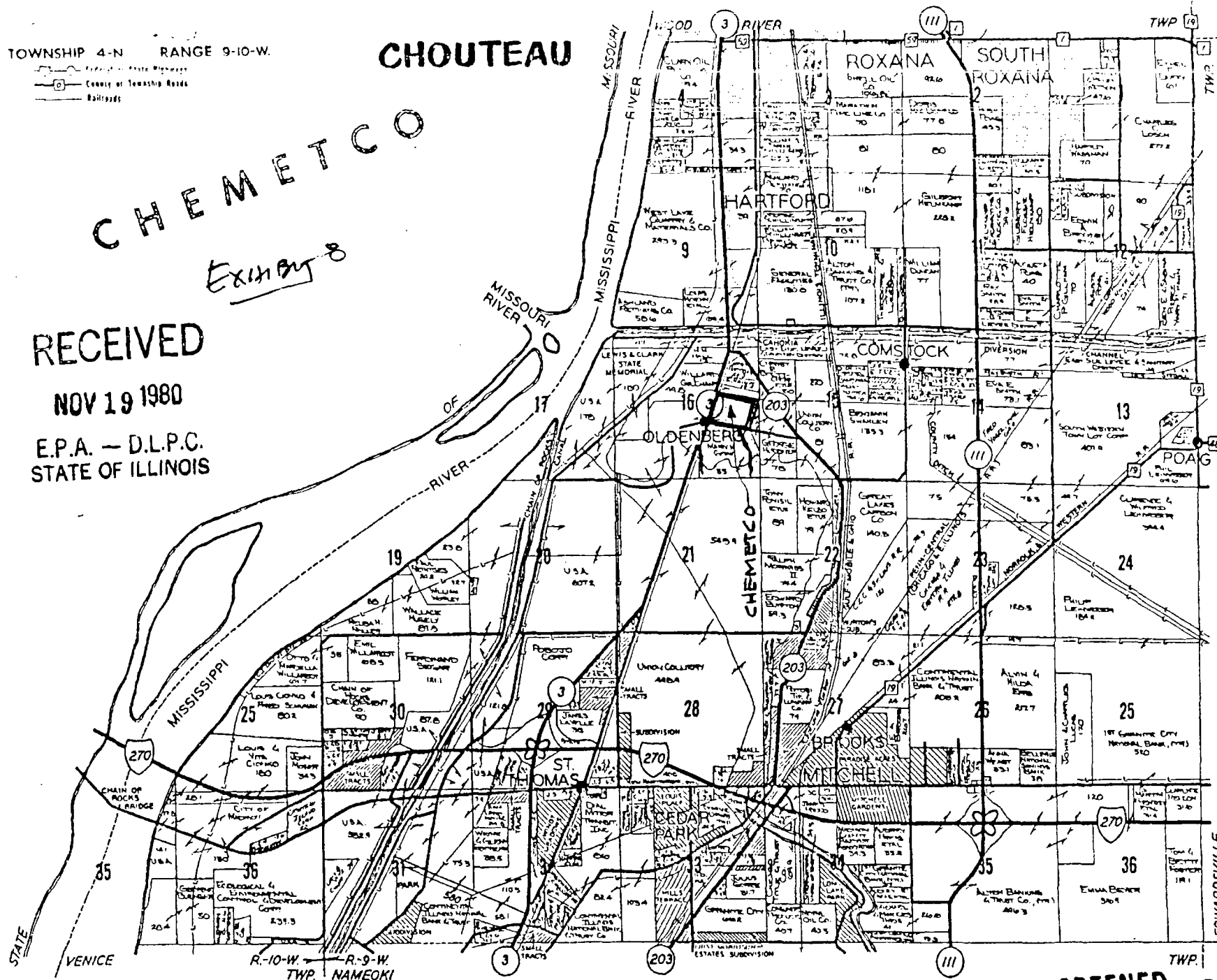
CHEMETCO

EXHIBIT 8

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NOV 19 1980

E.P.A. - D.L.P.C.  
STATE OF ILLINOIS



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BF 34

RECEIVED

NOV 19 1980

E.P.A. — D.L.P.C.  
STATE OF ILLINOIS

# CHAIN OF ROCKS INDUSTRIAL PARK

MADISON COUNTY, ILLINOIS

CHEMETCO  
EXHIBIT 9

GRANITE CITY

HORNER & SHIFRIN  
CONSULTING ENGINEERS  
ST. LOUIS, MISSOURI  
JUNE 1964

ST. LOUIS

EAST ST. LOUIS

64-24  
SCREENED BY

# HORNER & SHIFRIN

CONSULTING ENGINEERS

W. W. HORNER 1955  
H. SHIFRIN 1955  
E. E. BLOBB  
V. C. LISCHER

1221 LOCUST STREET

ST. LOUIS, MO. 63103

CHESTNUT 1-1570

AIRPORTS  
SEWERAGE & DRAINAGE  
PUMPING STATIONS  
HYDROLOGY  
FLOOD CONTROL  
SEWAGE TREATMENT  
INDUSTRIAL WASTE TREATMENT  
WATER SUPPLY & TREATMENT  
PAVING  
STRUCTURES  
SOILS ENGINEERING  
INDUSTRY ENGINEERING SERVICES

ASSOCIATES  
E. R. BREIHAN  
D. K. HASEDAWA  
R. E. PREUBER  
W. B. SHIFRIN  
V. A. SILBER  
F. E. WISELY

June 12, 1964

Chain of Rocks Industrial Park  
Madison County  
Illinois

Gentlemen:

The investigations made of the proposed 2,500-acre Chain of Rocks Industrial Park, indicate that the site is physically capable of industrial development. The reasons for this conclusion are summarized as follows:

1. Excellent highway, rail and river transportation facilities are immediately available. Air service is convenient.
2. Public water supply, natural gas for heating, electrical power and telephone service are all available and can be expanded as needed to adequately supply the area.
3. The site is satisfactorily protected against flooding of the Mississippi River by the Corps of Engineer levee system.
4. No serious problem exists regarding flooding from interior storm drainage.
5. Adequate foundation bearing capacities exist for constructing spread footing for normal loads or for driving friction piles into underlying dense sands for concentrated heavy loads.
6. The ground water supply is excellent with the possibility of developing 2,000-gallon per minute relatively shallow wells into the alluvium aquifer. Water might also be obtained directly from the Mississippi River.
7. The disposal of either sanitary or industrial wastes would not present any unusual problems.

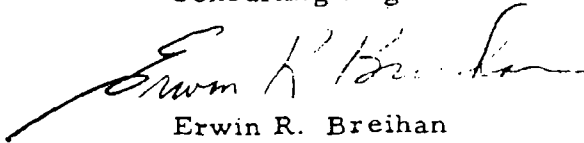
Chain of Rocks Industrial Park  
Madison County, Illinois

Page 2  
June 12, 1964

In our judgment, the site has an excellent potential for industrial development.

Respectfully submitted,

HORNER & SHIFRIN  
Consulting Engineers



Erwin R. Breihan

ERE hs

PROPOSED DEVELOPMENT

CHAIN OF ROCKS INDUSTRIAL PARK  
MADISON COUNTY, ILLINOIS

HORNER & SHIFRIN  
Consulting Engineers  
St. Louis, Missouri

JUNE 1964

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MISSISSIPPI RIVER FLOOD PROTECTION	2
INTERIOR DRAINAGE FLOOD PROTECTION	3
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WASTE WATER DISPOSAL	13

### EXHIBITS

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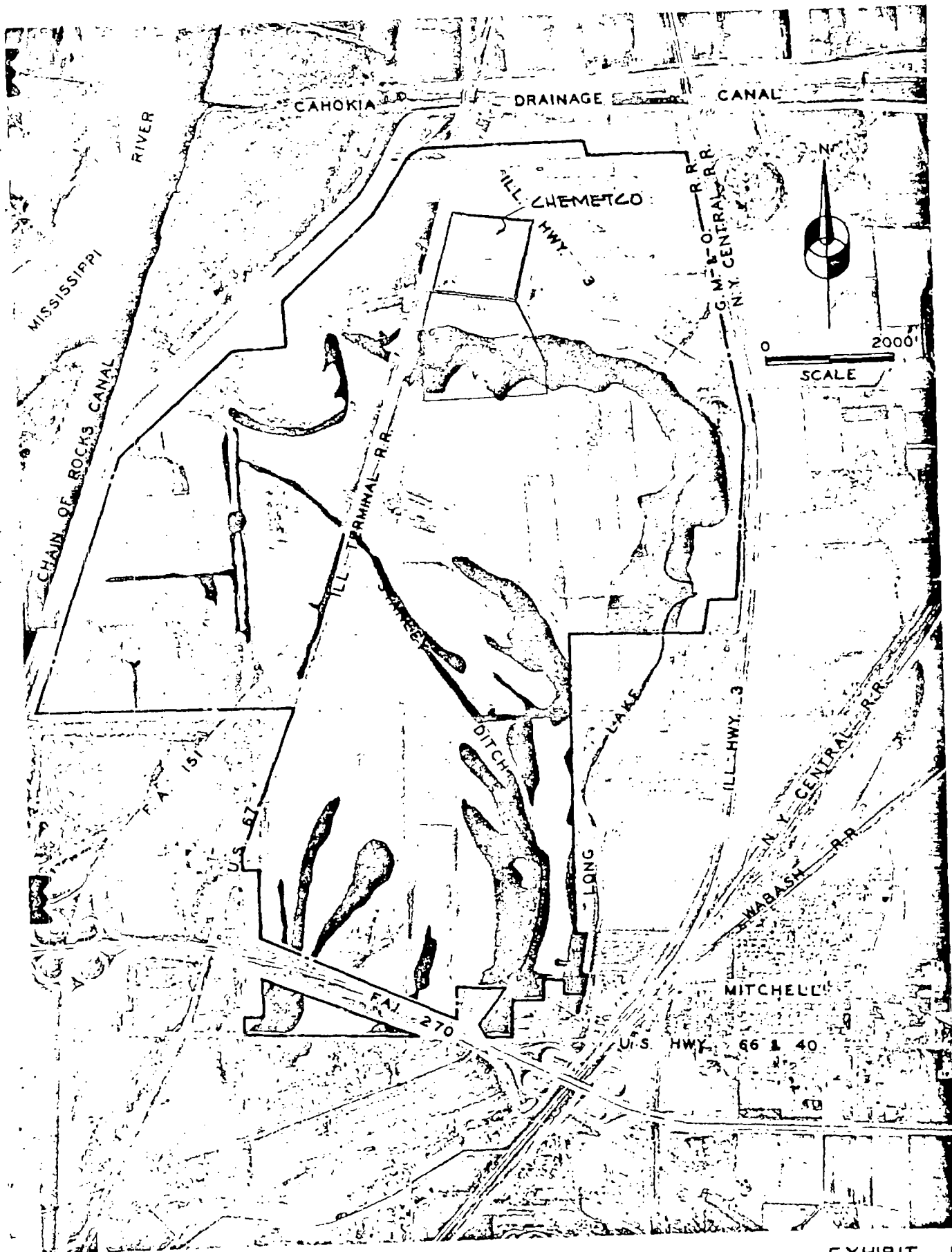


EXHIBIT I

PROPOSED DEVELOPMENT OF  
CHAIN OF ROCKS INDUSTRIAL PARK

HORNER & SHIFRIN  
Consulting Engineers

INTRODUCTION

The purpose of this preliminary report is to investigate certain pertinent physical features of the Chain of Rocks Industrial Park site to determine its suitability for development. These investigations include considerations of protection against flooding by the Mississippi River; protection against flooding by storm water runoff of tributary areas; building foundation conditions; ground water availability for industrial usage; and waste water disposal.

GEOGRAPHY

The site of the proposed Chain of Rocks Industrial Park, shown on Exhibit 1, contains some 2,500 acres and is immediately northwest of Mitchell, Illinois. It is bounded on the south by Interstate Highway I-270, which is presently under construction; on the west by U. S. Highway 67 and the Chain of Rocks Canal; on the east by the Gulf, Mobile and Ohio, and the New York Central Railroads; and on the north by the Cahokia Drainage Canal. The Illinois Terminal Railroad crosses the property running north and south.

The area is typical river bottom land with little or no relief. The entire Chain of Rocks Industrial Park is within the Chouteau, Nameoki and Venice Drainage and Levee District. Considerable revisions of the drainage system for that District were accomplished by the U. S. Army Corps of Engineers in connection with the construction of the Chain of Rocks Canal. Most of the industrial park site is now tributary to the Stanley Ditch which flows from north to south, approximately through the center of the property. A portion of the eastern area drains to Long Lake. Both the Stanley Ditch and Long Lake drainage systems and low-lying lands immediately adjacent to these serve as ponding areas during runoff periods. The area is drained by gravity through a 48-inch discharge line to the Chain of Rocks Canal at the northwest corner of the U. S. Army Granite City Depot. During periods when the Mississippi River is above

Stage 18 on the St. Louis Market Street gage, the gravity outlet to the Chain of Rocks Canal is closed and all ponded water is evacuated by pumping over the east levee of the Chain of Rocks Canal at the Chouteau, Nameoki and Venice Drainage and Levee District pumping station, located about one mile south of U.S. Highway 66.

The railroads and the major highways provide excellent surface transportation to the site and the nearness of the Chain of Rocks Canal permits ready access to river barge traffic. Either the Bi-State Port or the Tri-City Port, which are about 5 miles southwest, could serve as a terminal for barge traffic; or, if a need developed, the channel could be widened for a port near the canal's northern or upper end, which is adjacent to the site. With the completion of Interstate Highway I-270, the Lambert-St. Louis Municipal Airport will be convenient to the Chain of Rocks Industrial Park.

All of the land proposed for development is presently used for agricultural purposes. There is some residential development outside and southeast, east and southwest of the suggested boundaries.

Public water supply mains of the Mitchell Public Water District are along the southern and the eastern edges of the area and could be fortified, if necessary, and extended to serve the development. The Mitchell Public Water District purchases water from the East St. Louis and Interurban Water Company and are responsible for the distribution of water in the district.

Three gas transmission pipe lines of the Mississippi River Fuel Corporation cross the proposed industrial development. It is reasonable to assume that if an industry with an appreciable need for gas heat in their manufacturing processes is established here, the necessary gas to properly serve the need would be made available.

Sufficient electrical power is available to serve necessary requirements. Telephone service can be made available when a need for such service develops.

#### MISSISSIPPI RIVER FLOOD PROTECTION

The entire area is satisfactorily protected against flooding from the Mississippi River by an extensive network of levees, constructed by the U.S. Army Corps of Engineers. These levees are designed to contain a discharge in the Mississippi River of 1,300,000 cubic feet per second, which is the estimated flow that occurred on June 28, 1844, and is the highest flow of record. This flood resulted in a river stage of 41.39 feet on the St. Louis Market Street gage. Because of the containment of the rivers, both by existing and presently proposed levees, the design of the

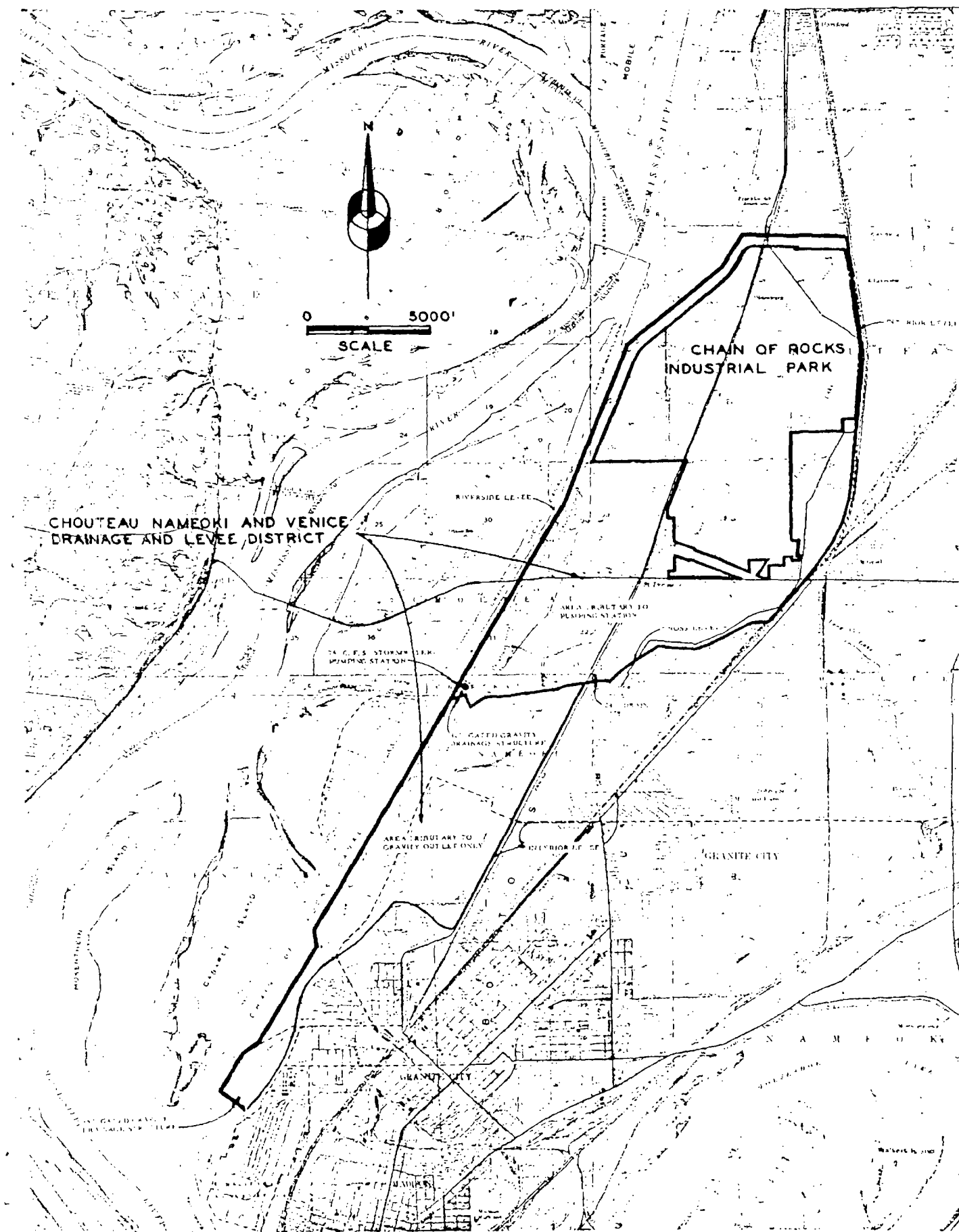


EXHIBIT 2

levee system in the St. Louis area with the above mentioned record quantity of flow is predicated on a flood peak of Stage 52, referenced to the Market Street gage. This offers protection against a flood that is expected to occur with a frequency of about 200 years. The levee systems protecting both the east and the west sides of the Mississippi in the St. Louis Metropolitan Area are based on the complete containment of this flood peak.

#### INTERIOR DRAINAGE FLOOD PROTECTION

a. Drainage District. As shown on Exhibit 2, the Chain of Rocks Industrial Park is entirely within the Chouteau, Nameoki and Venice Drainage and Levee District. This District was organized in 1888 for protection against flooding both by the Mississippi River and by storm water runoff within the area itself. When the Chain of Rocks Canal was constructed in the 1950's, a levee was constructed by the U. S. Army Corps of Engineers to contain the Canal and to further protect the land areas against flooding by the Mississippi River. This levee was constructed to higher standards and provides a greater degree of protection than the original levee system offered.

Prior to this canal levee construction, the Chouteau, Nameoki and Venice Drainage and Levee District had a 74 cubic foot per second pumping station in its northwest area to evacuate local trapped storm drainage that accumulated when the Mississippi River stage was too high to permit gravity discharge. The pumping station was abandoned and a replacement installed in the southwest area of the District as part of the canal construction. This replacement station has a capacity of 75 cubic feet per second with a minimum forebay elevation of 405.

The Chouteau, Nameoki and Venice Drainage and Levee District boundaries are roughly, the Chain of Rocks Canal on the west, the Cahokia Diversion Channel on the north, and The East Side Levee and Sanitary District on the east and south. The District maintains a system of ditches for interior drainage and operates the pumping station previously mentioned. The gravity drainage outlet to the Chain of Rocks Canal is at the extreme southern end of the District at the U. S. Army Granite City Depot.

An interior cross levee separates the Chouteau, Nameoki and Venice Drainage and Levee District into two parts. The tributary area north of this cross levee contains 4,718 acres from the Chouteau, Nameoki and Venice Drainage and Levee District, and 1,228 acres of bottom land that lies within the boundaries of The East Side Levee and Sanitary District, for a total of 5,946 acres. Additional bottom land drainage from the east is prevented from discharging into this system by the Gulf, Mobile and Ohio Railroad embankment which serves as an interior levee. The storm runoff from this north area is discharged through the cross levee by a

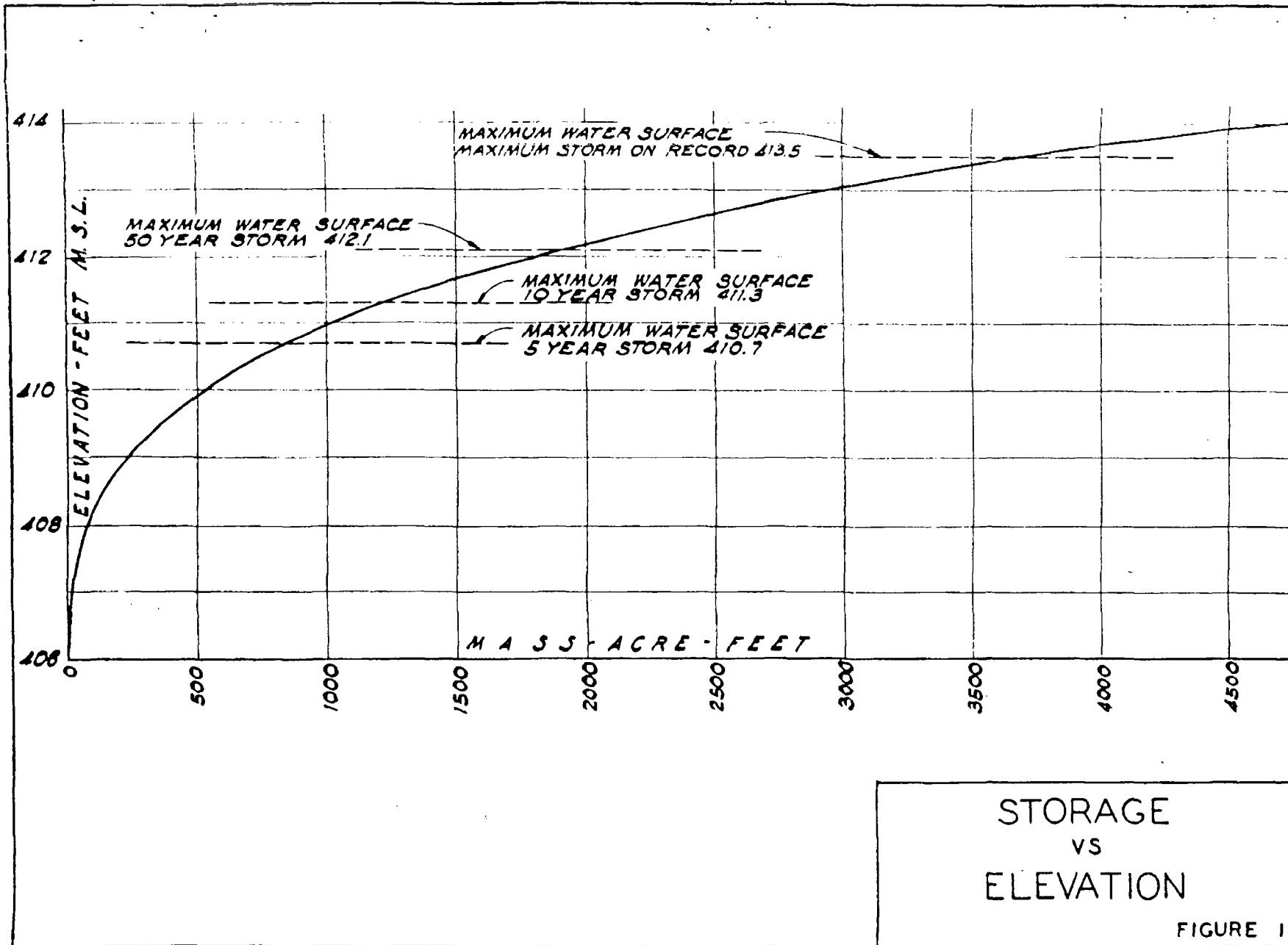
42-inch gravity culvert with a backwater gate to the southern portion of the district or is pumped over the east levee of the Chain of Rocks Canal by the 75 cubic foot per second pumping station mentioned above.

The 42-inch gravity culvert through the cross levee discharges into a drainage ditch running parallel and east of the canal levee. This ditch also collects the storm runoff from an additional 404 acres of the Chouteau, Nameoki and Venice Drainage and Levee District, 891 of The East Side Levee and Sanitary District, and 130 acres of the Granite City Harbor Area. This totals 1,425 additional acres of tributary area, all of which is discharged by gravity through the levee of the Chain of Rocks Canal through a 48-inch pipe with a sluice gate at the northwest corner of the Granite City Army Depot. When the Mississippi River is above Stage 18 on the St. Louis Market Street gage, the 48-inch outlet gate is closed and there is no further gravity discharge to the river until the stage lowers. Again additional bottom land drainage from the east is prevented from discharging into the system by interior levees.

The Chouteau, Nameoki and Venice Drainage and Levee District pumping station does not pump storm drainage originating from the 1,425 acres south of this cross levee. Only the ponded storage in the area north of the cross levee from the 5,946 acres is evacuated by the pumping station. This existing station is usually used during periods when there is no satisfactory gravity drainage outlet to the Chain of Rocks Canal. It is recommended, however, that the pumping station be operated whenever any significant advantage can be gained thereby, even during times of gravity discharge through the cross levee. The 75 cubic feet per second capacity of the pumping station would assist materially in evacuating any storm drainage which is collected in the drainage system and is restricted by the capacity of the 42-inch outlet at the cross levee.

b. Effect of 50-Year Storm. The area under consideration for development as the Chain of Rocks Industrial Park was studied topographically to determine what effect a critical storm, say one occurring on the average of once in 50 years, would have on the present drainage facilities of the area. Data for this storm were taken from a report titled "Interior Flood Control Improvements, East St. Louis and Vicinity" of the U. S. Army Corps of Engineers, St. Louis District, dated November 1962. The rainfall data were based on duration-depth and duration-intensity curves on file in the St. Louis District Office. These curves were developed by the Corps from records of the U. S. Weather Bureau Station, St. Louis, Missouri.

The Corps studies were concerned with the same type of bottom land drainage as exists in the Chouteau, Nameoki and Venice Drainage and Levee District. From these studies it was found that for the 50-year storm,



in which there was a total of 6.77 inches of rainfall, the excess precipitation, which is the difference between the rain that actually fell and the losses to infiltration and retention, amounted to 4.04 inches. All the excess precipitation occurred over a 3.5-hour period of the 14-hour storm pattern.

Because of the high infrequency of occurrence of such a storm, it was assumed that this storm would occur when the Mississippi River stage was sufficiently low to permit gravity outlet drainage. During the period of excess precipitation, it was considered that the 75 cubic feet per second pumping station and the 42-inch diameter gravity outlet pipe would be discharging during 3 hours of the 3.5-hour period of runoff. The 42-inch gravity culvert would discharge at an average rate of about 50 cubic feet per second. Therefore the total discharge would be at a rate of about 125 cubic feet per second for this 3-hour period with a total mass discharge of 31 acre-feet.

The total mass excess rainfall or runoff developed from the tributary acreage would be about 2,000 acre-feet, which when reduced by the 31 acre-feet discharged by pumping and gravity would require that 1,969 acre-feet be stored in the low-lying areas. With this amount of storm runoff in storage, 400 acres of the 2,500-acre Chain of Rocks Industrial Park site would be covered with water.

A mass storage chart was developed for the northern portion of the Chouteau, Nameoki and Venice Drainage and Levee District and is included herewith as Figure 1. To store the excess rainfall or runoff from a 50-year frequency storm, water in the low areas would rise to about elevation 412.1. Therefore any building or development that might be damaged by standing water should be constructed above that elevation. Parking lots and other usage might be made of land at or even below this elevation with the expectation that at infrequent periods, temporary inundation might occur. The extent of this flooding occasioned by a 50-year frequency storm is shown in blue on Exhibit 1.

To evacuate 2,000 acre-feet of precipitation excess by the present pumping and gravity discharge facilities would require a considerable period of time. At the rate of 75 cubic feet per second of pumping and 50 cubic feet per second of gravity discharge, the evacuation would proceed at the rate of about 10.3 acre-feet per hour. This means that it would take a little more than 8 days to completely evacuate the precipitation excess of a 50-year storm, assuming no storm water in storage above elevation 406 at the beginning of the precipitation excess and further that during these 8 days there was no additional precipitation excess that would add to this storage volume.

To explore the effect on ponded water level of additional precipitation excess that might occur shortly after the 50-year storm during the discharge period of the stored runoff, the runoff from the one-year storm was examined. This storm produced a precipitation excess of 0.20 inches from a total rainfall of 1.28 inches extending over a 12-hour period. This amounts to about another 120 acre-feet of runoff that must be discharged. With the present discharge system, this would require approximately 12 hours to remove. Since neither the loss of water from the ponded storage into the soil, nor the evaporation from the water surface was taken into consideration, it is believed that the additional runoff from an average one-year storm will probably be taken care of by infiltration and evaporation and would not significantly prolong the time required to evacuate the stored runoff of the 50-year storm.

An investigation was also made as to the effect a 50-year storm might have on the area considering the Mississippi River to be at Stage 18, when all gravity discharge to the river would be blocked and the pumping station would be the only outlet for the ponded storage. The total rainfall for a 50-year storm coincident with a river stage of 18 was computed to be 5.75 inches, rather than the 6.77 inches that might be expected from a non-coincident storm, when the river was not at flood stage. Accordingly, the precipitation excess would be reduced about one inch, say from 4.05 inches to 3.05 inches. The total mass runoff from the 50-year storm that might be expected to occur coincident with an 18-foot stage would be 1,820 acre-feet. During this period, the pumping station discharging for three hours at 75 cubic feet per second would reduce this about 20 acre-feet and the water would rise to about elevation 411.9 as compared to the 412.1 elevation estimated to occur when the Mississippi River was not in flood stage.

With the gravity outlet blocked and the pumping station operating at 75 cubic feet per second, it would take a little more than 12 days to evacuate the 50-year storm that would occur coincident with the Mississippi River at Stage 18. The time of evacuation would be a bit longer from a coincident 50-year storm, but the flooding would be less than might be expected from a 50-year non-coincident storm with gravity discharge available.

c. Effect of 10-Year Storm. The precipitation excess resulting from a 10-year storm was also examined. Data from the Corps of Engineer's report on interior flood control improvements was again used as a basis for computing volume of runoff. For this storm the Corps studies indicated a rainfall excess of 2.51 inches over a 3-hour period, which for the 5,946 acres tributary, would result in 1,245 acre-feet of runoff. The 10-year storm was considered to occur over a 10.5-hour

period and to total 4.95 inches of rainfall. Again storage is reduced by the pumpage and discharge through the 42-inch pipe. For a 2.5-hour period the reduction in storage would amount to about 26 acre-feet. The total storage for the 10-year storm would therefore be about 1,219 acre-feet and the stored water would rise to elevation 411.3.

To evacuate this storage using the same pumping and gravity discharge rates as used in the previous computations, approximately 5 days would be required for a storm expected once in 10 years.

d. Effect of 5-Year Storm. Using the same basic data, the excess rainfall from a 5-year storm would be about 1.73 inches over a 2.5-hour period, and for the 5,946 tributary acres would amount to 857 acre-feet. The 5-year storm was considered to occur over a 9.5-hour period and to total 3.9 inches of rain. Pumping and discharge through the 42-inch gravity drain over a 2-hour period would account for about 21 acre-feet of discharge. The total storage would amount to about 836 acre-feet and would rise to elevation 410.7.

For the 5-year storm runoff, it would take approximately 3.4 days to evacuate only the runoff from that one storm period.

e. Effect of Maximum Storm of Record. The area proposed for an industrial development was also checked to determine the amount of flooding that would occur with the present drainage configuration and the maximum storm of record for this area.

This maximum storm of record was a 36-hour storm occurring on two successive nights, August 14 and 15, 1946. The storm was unusual, not only because of extremely heavy rainfall, but also because of the very wet ground on which it fell. Rainfall previously had occurred on August 1st, 2nd, 3rd, 5th, 8th, 12th and 13th, and a fairly heavy storm occurred on the morning of the 14th, just preceding the first severe storm on the evening of the 14th.

This storm produced precipitation in amounts far beyond anything that has occurred in the entire 110-year period of rainfall records for the St. Louis area. For the period of August 2nd to 5th, rainfall of 4.86 inches was recorded at the St. Louis Weather Bureau Station. The period of August 6th to 12th produced several light thundershowers totaling an additional 0.49 inches. The sum of these, that is, rainfall from August 2nd to 12th inclusive, 5.35 inches, was in itself much greater than the normal rainfall for the entire month of August. On the night of August 12th, 0.41 inches of rain occurred in 6 hours. On the night of August 13th, 0.98 inches occurred in about 10 hours. This rainfall also produced no

considerable runoff problem, but brought the soil moisture up to a very high condition, reducing materially the infiltration capacity.

On the night of August 14th, the St. Louis Weather Bureau recorded 4.78 inches in about 14 hours. On the night of August 15th, there was recorded 8.78 inches of rain, also in about 14 hours, producing a total for the period of about 36 hours of 13.56 inches. However, neither at the St. Louis Weather Bureau Station nor at any other station in the area did the hourly intensity of rainfall approach a record. During this storm the maximum amount being recorded in any one hour was slightly over 2 inches, equivalent to about what might be expected once in 5 years. For a successive period of 3 hours, a total rainfall approaching 4 inches was recorded. This is about equal to an occurrence expected once in 50 years. For a period of 6 hours, a total of 5-1/2 inches occurred, about equal to the 100-year record for the area. For a period of 14 hours the 100-year record is about 6-1/2 inches, whereas this storm produced 8-3/4 inches. For a period of 36 hours, the 100-year record is about 7-1/2 inches, whereas this storm produced about 13-1/2 inches, or nearly twice the rainfall expected for a 100-year storm.

To study the effects on the area of a recurrence of the August 1946 storm, the precipitation excess values developed in the "Detail Report - Selected Plan, Hillside Diversion Project", as prepared by Horner & Shifrin for The East Side Levee and Sanitary District and the State of Illinois, dated September 1950, were used. The precipitation excess values as developed in that report for the bottom land areas in the Schoenberger watershed were used in this analysis since the soils and topography of the Schoenberger watershed were considered as being similar in character to those of the industrial site. Of the 5.21 inches of rainfall which fell on this watershed on the night of August 14, 1946, 3.14 inches were considered as being lost, principally through infiltration resulting in a precipitation excess of 2.07 inches. For the storm of August 15th, of 8.74 inches, the losses were considered to be 2.66 inches, leaving a precipitation excess of 6.08 inches. Therefore, with a recurrence of the August 1946 storm, the total precipitation excess, or amount of water that would require storage, pumping, or discharge by gravity, would be 8.15 inches. This precipitation excess when applied to the entire tributary watershed of 5,946 acres would result in a runoff of 4,040 acre-feet. Considering the pumping station and gravity discharge reducing the storage volume by 125 cubic feet per second, for the 36 hours some 370 acre-feet would have been discharged, with 3,670 acre-feet still in storage at the end of the rainfall period. Even this maximum storm would be stored within elevation 413.5.

f. Conclusions. From the foregoing and by examination of the contour map of the area, it is evident that no serious problem exists

regarding flooding from interior drainage. By proper placement of the critical buildings or by raising portions of the site immediately adjacent to the buildings a minimum amount, it would be possible to eliminate all critical flooding conditions. Under normal river conditions (below approximately Stage 18), the existing pumping station and the 42-inch gravity culvert through the cross levee would evacuate stored water in the periods noted herein; namely for the 50-year storm, in about 8 days; for the 10-year storm in about 5 days; and for the 5-year storm in about 3.4 days.

Under conditions of blocked drainage, that is when the river is above Stage 18 and no gravity discharge is possible, all storage must be evacuated by pumping alone. As previously discussed, the rainfall for a 50-year storm coincident with an 18-foot river stage would be 5.75 inches rather than 6.77 inches for a non-coincident rain storm. For such a condition, the stored water would rise to a somewhat less elevation, but would take approximately 50 per cent longer time to evacuate by pumping only.

To increase the size of the pumping station would not appreciably reduce the elevation to which the storm precipitation excess would pond. An increase in pumping capacity would only serve to reduce the time required to evacuate the stored runoff. Since it has been shown that the evacuation time with the present pumping facilities is not unreasonably long, it would not appear to be economically justified to increase the capacity of the pumping station.

#### FOUNDATION CONDITIONS

A preliminary evaluation of the foundation conditions and the probable soil-bearing capacities at the proposed Chain of Rocks Industrial Park was made based upon areal soil information. This preliminary evaluation indicated satisfactory foundation conditions exist, however, a further study of the site, including test drilling and laboratory testing, was considered necessary to supplement the preliminary review.

Prior to any drilling and soil testing, the Engineering Departments of the Illinois State Highway Department, U.S. Army Corps of Engineers and the Railroads were contacted to determine the availability of soil information in this area.

The Corps of Engineers was involved in the construction of the Chain of Rocks Canal a few years ago, and have knowledge of the soils along the western edge of this proposed industrial property. The Illinois State Highway Department is now building portions of I-270 and F. A. 151, and furnished specific information pertaining to the soil condition in the

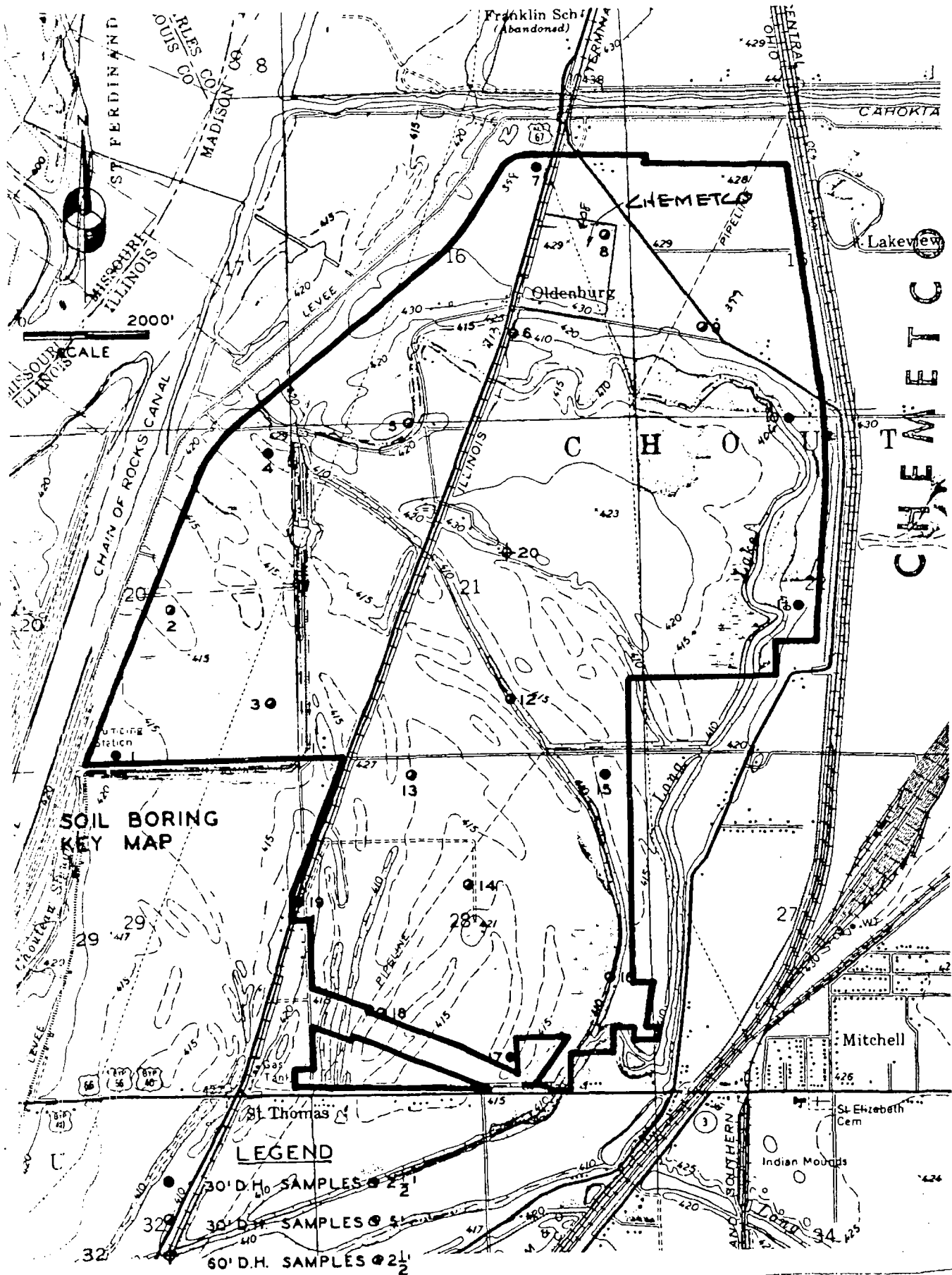


EXHIBIT 3

immediate areas concerned. The railroads constructed their track system many years ago and any soils information they might have developed at that time is not immediately available. The information obtained from the Illinois State Highway Department and the Corps of Engineers, however, pertains to specific areas and does not divulge local soil variations existing within the boundaries of the contemplated Industrial Park.

Based upon the supplied data, the soil profile appeared to be typical for an alluvial flood plain with shallow clays overlying silty sands and sands. The deeper borings made by the Highway Department at the south-east corner of the project site logged 100 feet of unconsolidated clay, silt and sand before reaching limestone.

a. Test Program. With the known depth to rock, and the need to properly evaluate the bearing capacities of the sands and overlying silty clay materials, a testing program was undertaken to furnish a representative indication of actual average soil conditions. To indicate in general the soil characteristics that might be expected in the 2,500 acres of the project site, 20 borings were drilled at locations shown on Exhibit 3.

To positively establish the absence of any deep buried soft silt or clay strata which might cause detrimental settlement of foundations, one hole. Test Hole No. 20, was located in the approximate center of the property and drilled to a depth of 60 feet. The remaining holes were carried to a depth of 30 feet below existing ground, about the limit of influence from expected footing loads. Soil testing in the laboratory was limited to the determination of plasticity index and unconfined compression strength of 6 samples taken at shallow depths. Standard field penetration tests were performed at regular intervals for the full depth of all 20 test borings. Soil samples recovered from the penetration test, but not tested in the laboratory were visually classified using the tested samples for reference.

b. Soil Conditions. The laboratory tests and the standard field penetration tests performed for this report were designed to obtain a general picture of the existing foundation conditions at the project site. Any one particular location could yield slightly different results, but the area in general is composed of medium to soft, fine grained material overlying medium density sands. The overlying clays and silts are thicker than originally assumed as inferred by the limited information obtained from field work in the surrounding area performed by others. The average thickness of the clays and silts varies from about 12 feet near the center of the property to approximately 30 feet near the Cahokia diversion channel. The surface clay and silt thickness on the southern property corner varies from test hole to test hole with extremes of 2 feet and 23 feet. The boring logs of these test holes are shown on Figures 2 through 8.

The silty clays found on the southern and western portion of the property generally are a Type A-7-6 soil as classified under the Highway Research Board classification system and tend to be less plastic than the clays found on the northern part of the site which are a Type A-7-5 soil. Both of these soils, however, are subject to extreme volume changes, but can be brought to a comparatively high density if properly compacted, as is evidenced by the highway structures presently under construction. Compaction to maximum density and adequate provisions for drainage will solve most of the problems associated with these soils.

c. Conclusions. Based upon the standard field penetration test made in each test hole and the 6 unconfined compression tests of the overlying fine grained material, average allowable bearing pressures can be assigned to the foundation soils. No unsatisfactory strata of either soft clay or loose sand was encountered in the 60-foot deep test hole, Test Hole No. 20.

Unconfined compression tests on the upper fine grained soils indicate safe bearing values from 2,000 to 2,700 pounds per square foot except at Test Holes No. 4 and No. 7. Lower values for the unconfined compression test on the clays and silty clays at Test Holes No. 4 and No. 7 indicate footing pressures should not exceed 1,200 pounds per square foot in these particular areas. The similar character of the material and the corresponding low penetration resistance of the silty clays in Test Holes No. 6 and No. 8 suggest the area immediately adjacent to the northwest property line may be composed of these softer materials limiting the allowable bearing pressure along this belt to 1,200 pounds per square foot. Usually the bearing value of such an area can be materially improved by the removal or compaction of these soft lenses.

The sand underlying the silts and clays varies from a somewhat loose to medium dense material. Footing loads supported on the overlying fine grained soil will only exert a small portion of the unit footing pressure on the sand, depending upon the thickness of material between the base of the footing and the top of the sand. Any load carried on the silts and clays can be safely supported on the underlying sand. In particular areas where sand is either near surface or where foundation excavations are carried deeper into the sandy material, normal densification or compaction of the looser sands can be accomplished during grading operations to adequately support footing loads in the neighborhood of 4,000 pounds per square foot.

Specific soil test should be made at each individual plant site in conjunction with its foundation design. Heavy concentrated loads which can not be supported on spread footings, depending upon the results of the soil investigation, can be supported on friction piles driven through

the clays and silts into the underlying sands. These friction piles would be relatively short length and are commonly used throughout the entire American Bottoms area to support such concentrated loads. Bearing piles to the underlying rock might also be utilized to support unusually heavy loads. Such piles would be in excess of 100 feet in length.

#### GROUND WATER AVAILABILITY

Geologic conditions favorable for large supplies of ground water are among the factors promoting the concentrated industrial development in the Mississippi flood plain of Madison and St. Clair Counties. This area is known collectively as the American Bottoms and includes the site of the proposed Chain of Rocks Industrial Park. The water-yielding deposits of the area are permeable sands and gravels in unconsolidated valley fill.

The valley fill which ranges from approximately 100 to 150 feet in thickness at the proposed industrial park, consists partly of recent alluvium and partly of old alluvium, some of which is glacial outwash material from the upper Mississippi Valley. The most favorable water-yielding deposits usually occur below a depth of 60 to 90 feet. Recharge of this ground water in the valley is by infiltration from rainfall and floods and in certain areas by percolation from the Mississippi River and its tributaries.

"Groundwater Geology of the East St. Louis Area, Illinois", by Robert E. Bergstrom and Theodore R. Walker, a 1956 publication of the Illinois State Geological Service was used as a background for this section of the report.

Most wells in the American Bottoms are in this valley-fill material which includes both alluvium and glacial outwash. Sufficient water is available in this aquifer for all present demands. A properly designed well could be expected to produce as much as 2,000 gallons per minute. If the wells were extended into the bedrock aquifer, it is probable that still more water would be available. The bedrock aquifers, however, are not too desirable because of the probability that the water from this source would be highly mineralized.

The ground water available from the alluvial deposits is, in general, of good quality. A small amount of iron might be expected but if this is objectionable for process water, it could be removed by aeration.

It should be noted that the proximity of the Mississippi River presents the opportunity for the development of a river intake for certain

process waters. Practically unlimited supplies of river water are available.

One of the major advantages of this particular site is the multi-source water supply; (a) from treated public water mains, (b) from relatively shallow wells in the alluvium ground water supply, or (c) from intakes in the Mississippi River.

#### WASTE WATER DISPOSAL

There are four categories of waste water which will require consideration for the development of the Chain of Rocks Industrial Park. These general categories are as follows:

- a. Sanitary Sewage.
- b. Industrial wastes with the characteristics of sanitary sewage.
- c. Industrial wastes not amenable to the same treatment processes as sanitary sewage.
- d. Industrial wastes of a character not requiring treatment.

a. Sanitary Sewage. Under the Illinois Sanitary Water Board criteria presently applicable, sanitary sewage may be processed in primary treatment facilities when the effluent of such facilities is discharged directly to major streams such as the Mississippi River. For the subject area it appears appropriate that the sanitary sewer system be collected and drained toward the northwest corner of the area so that the sewage treatment facility effluent will discharge directly to the Mississippi River. It would not be desirable to discharge this effluent directly in the Chain of Rocks Canal.

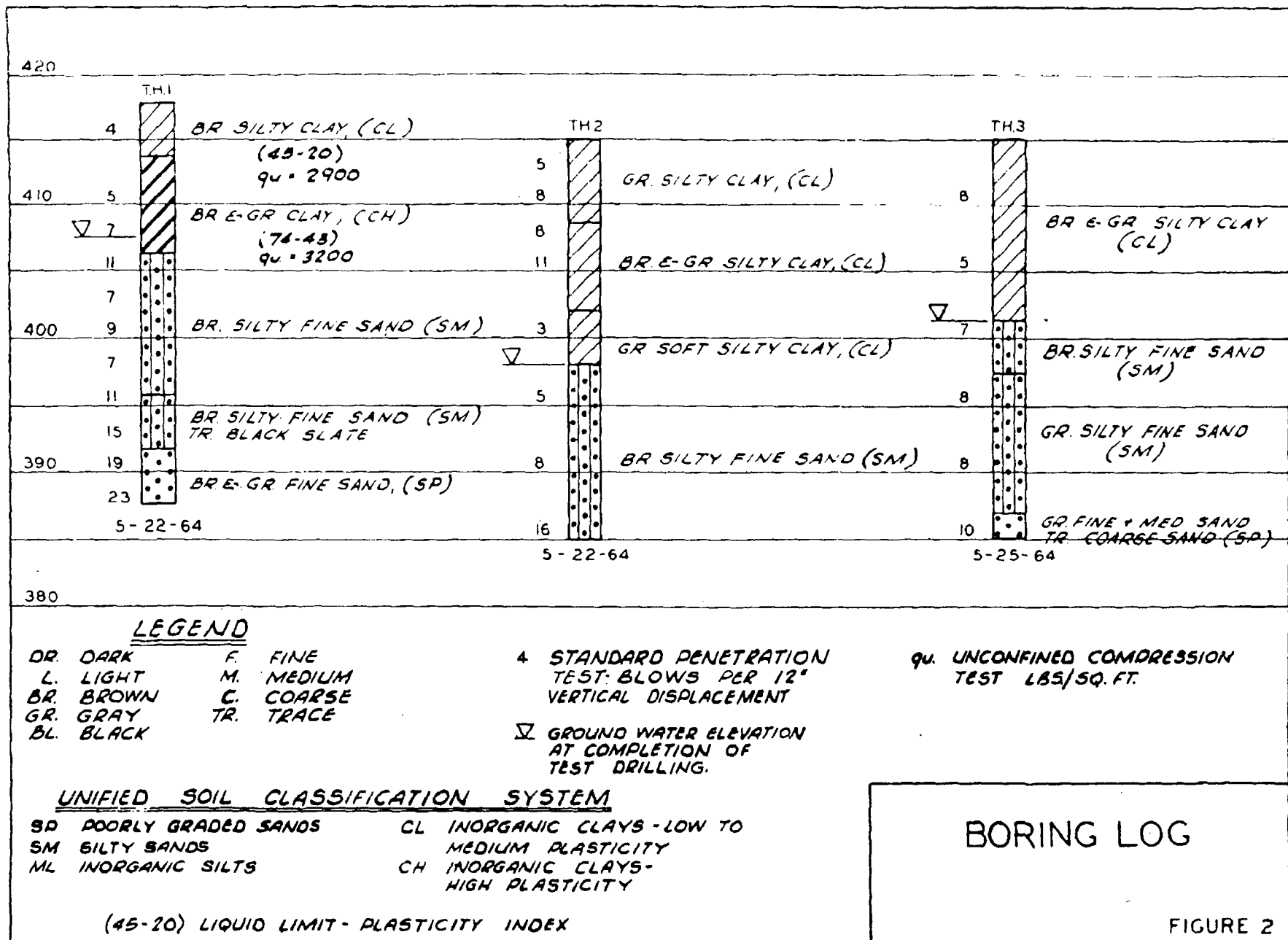
b. Industrial Wastes with Characteristics Similar to Those of Sanitary Sewage. Wastes of this type pose no particular problem with regard to treatment. It would be advisable to design any sanitary sewer system so that sufficient capacity would be available for a reasonable amount of such wastes.

c. Industrial Wastes Not Amenable to Treatment in Facilities Designed for Sanitary Sewage. Wastes of this type would be those which would be highly acidic or highly alkaline, those which would contain excessive amounts of dissolved solids, those containing excessive amounts

of toxic materials, and those containing phenolics or other materials capable of producing tastes or odors in public water supplies. It appears appropriate to presume that individual industries as they locate within the area will be required to provide their own facilities for the disposal of wastes of these types. In some cases it may be possible for preliminary in-plant treatment to provide an effluent which would allow discharge into the normal sanitary sewer system. In other cases, treated industrial wastes of these types may be required to be discharged directly to the Mississippi River.

d. Industrial Wastes of a Character Not Requiring Treatment.

Again, under the present criteria of the Illinois Sanitary Water Board, it would be possible for certain types of wastes to be discharged directly to the Mississippi River without any treatment. It would not be advisable to discharge such water into the storm drainage ditches, however, because of the extreme length of the outlet ditch. Such waste waters would consist of cooling waters or water only moderately polluted. At the present time, it is understood that the Illinois Sanitary Water Board would permit discharge directly to the Mississippi River such waste waters that would contain no floating or settleable solids, waters containing no toxic materials, or waters containing no taste and odor producing materials. Under the present criteria, it might be possible to discharge directly to the river those waters which contain as much as 100 milligrams per liter of suspended solids. It presently appears that the current criteria will prevail for a good many years. However, should secondary treatment eventually be required for sanitary wastes, it is quite possible that moderately polluted wastes, which currently could be discharged directly to the Mississippi River, may be required to undergo complete treatment.



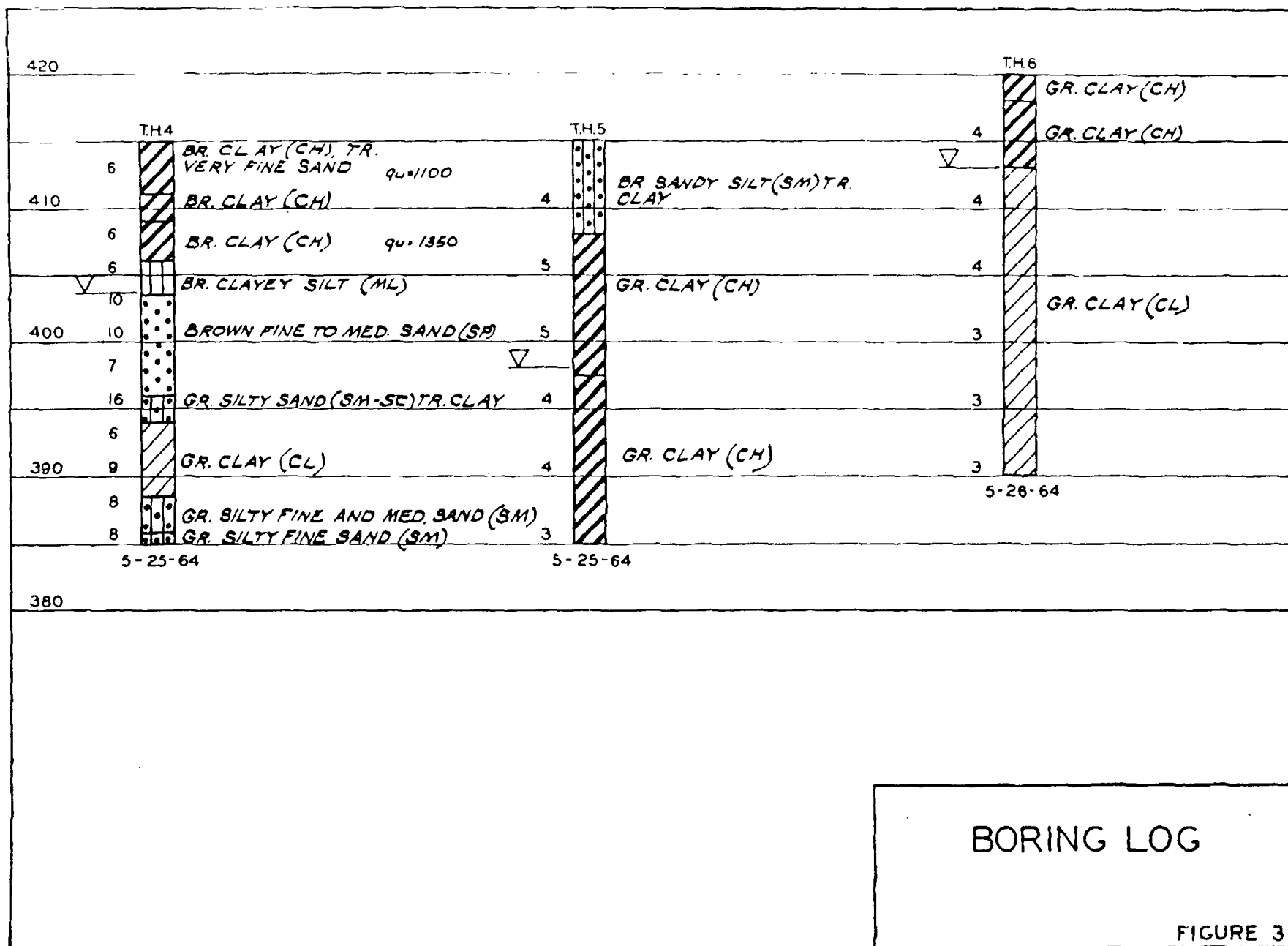
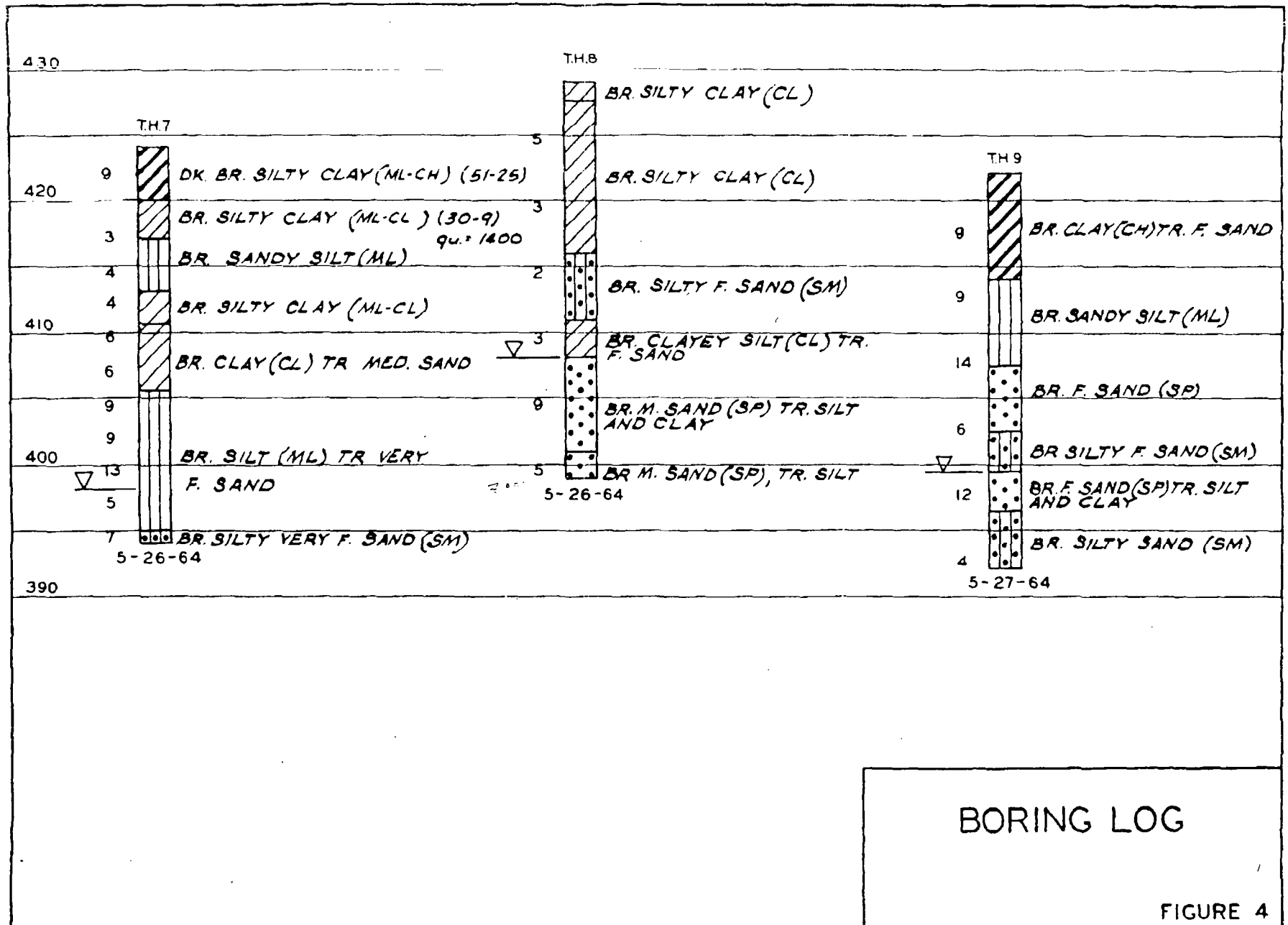
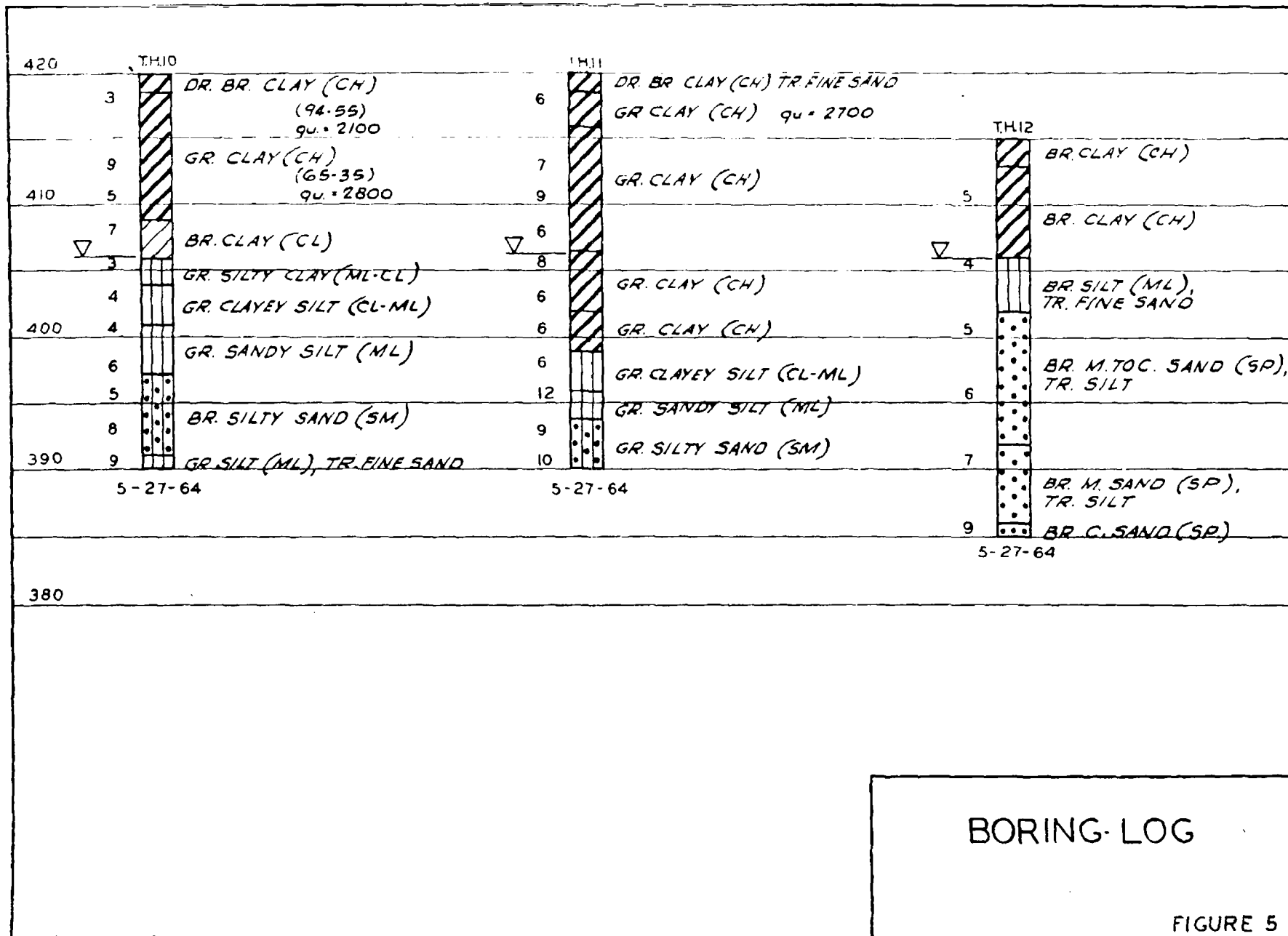
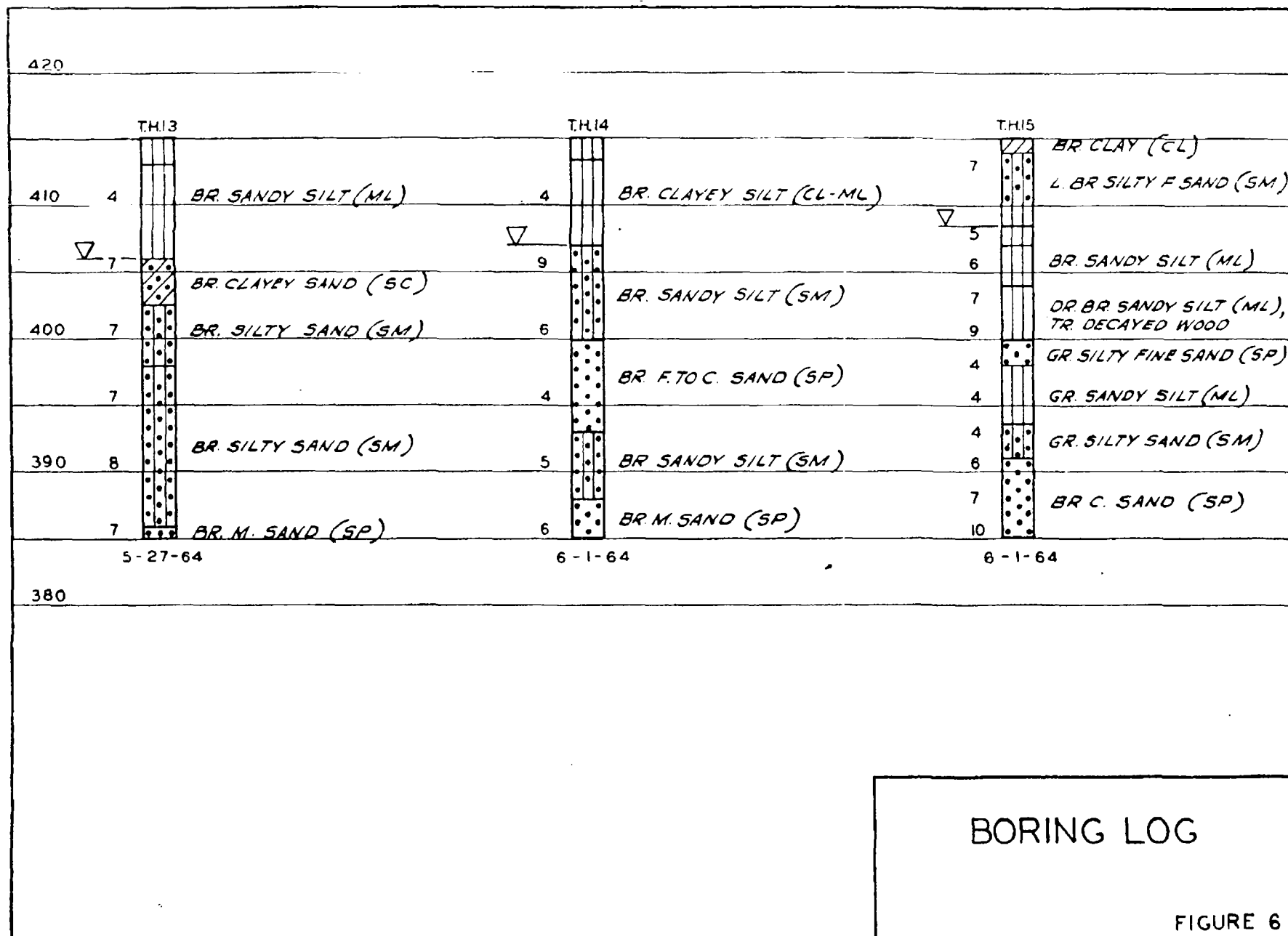
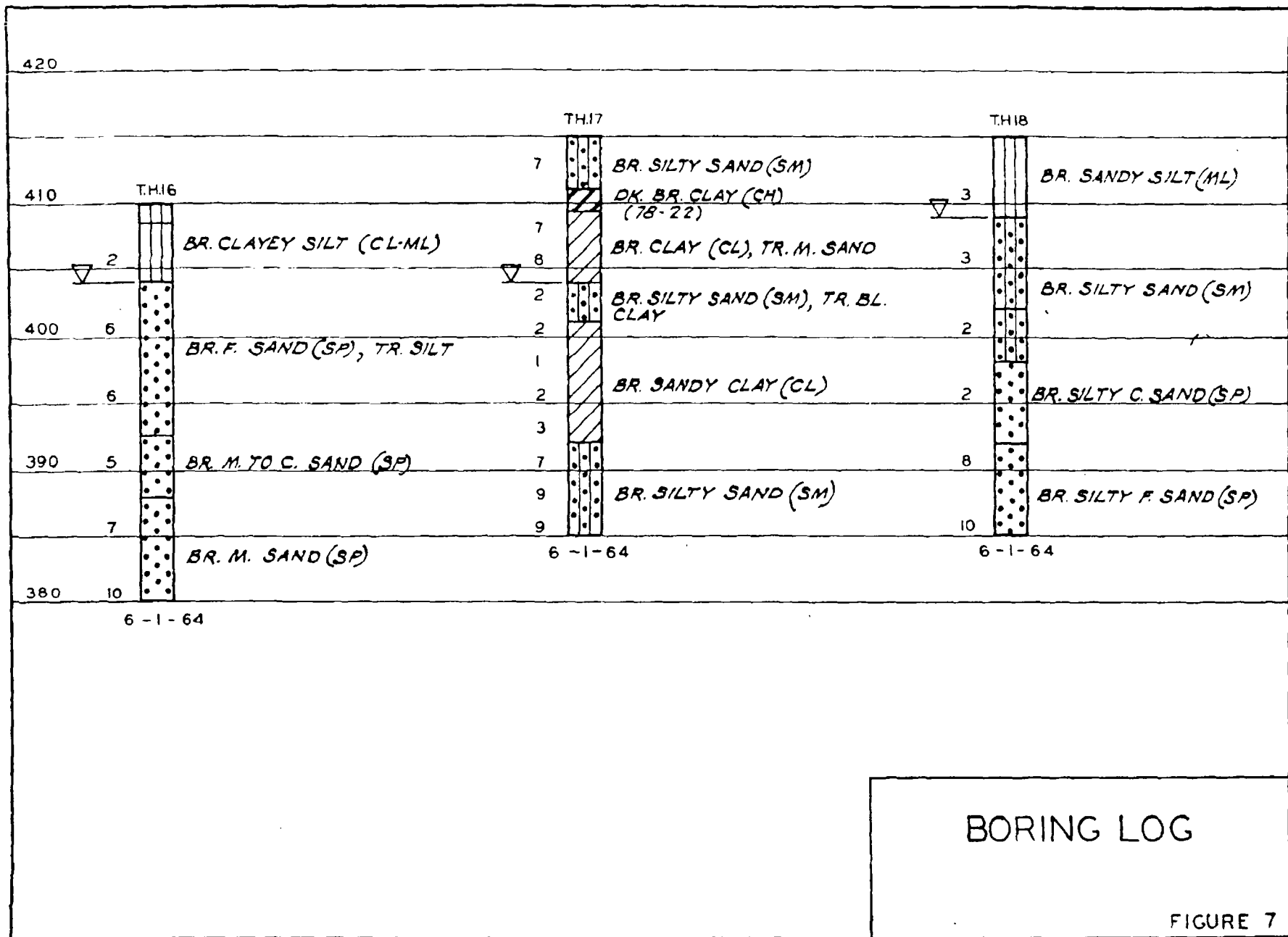


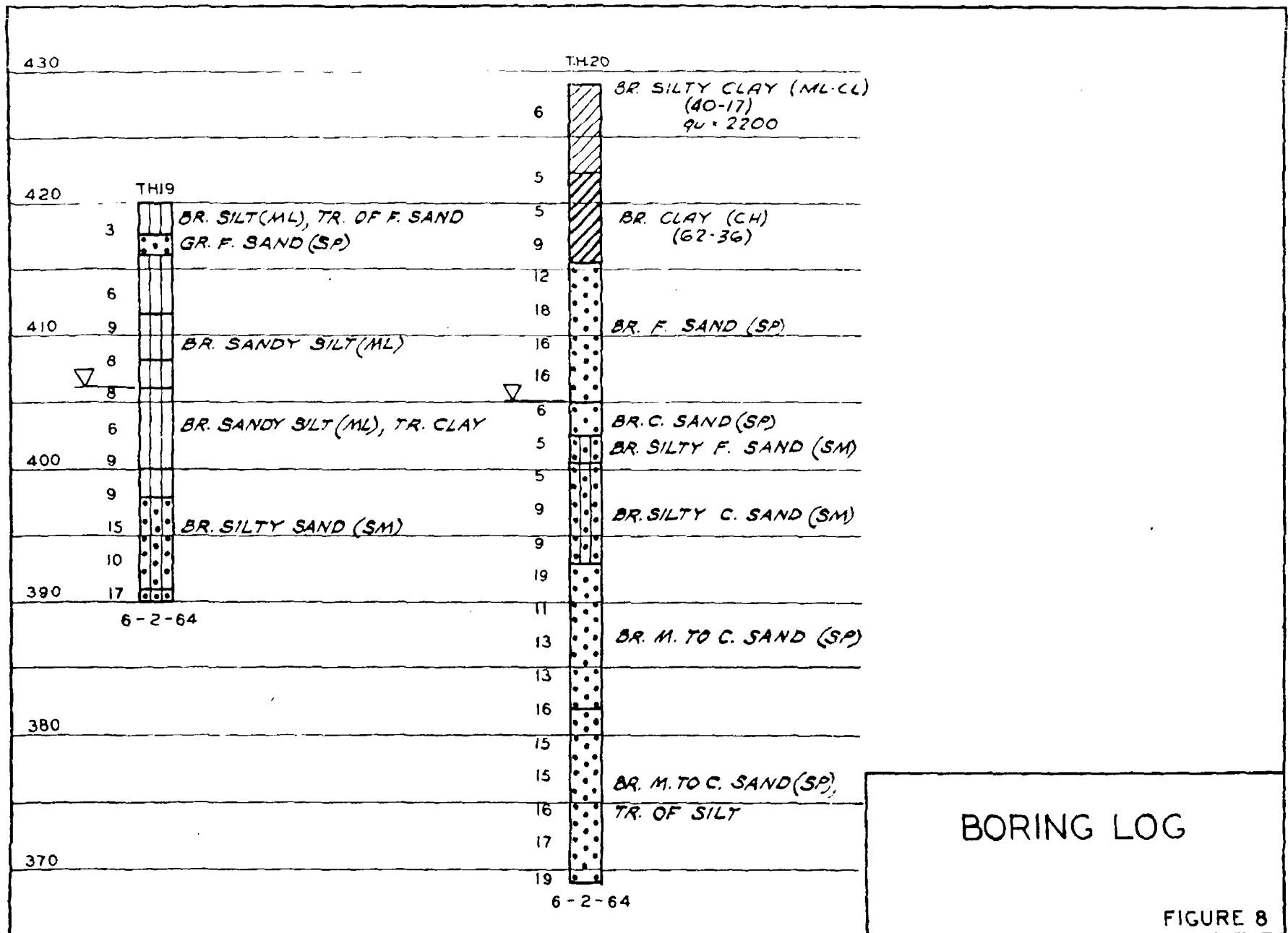
FIGURE 3











CHEMETCO  
BALER SPRINKLER PLAN

Gary Roberts  
Jim Buescher  
Carl Cardwell: Please review this  
and add to it  
your comments to  
make it a useful  
plan. *Chene*

1. The foreman will inform the Baler operator that the sprinkler system must be turned on for approximately 3-5 minutes once every hour.
2. The foreman will watch this process to ensure its being done, or examine the area after each time it is to have been done for signs of sprinkler usage (i.e. damp area around Baler).

The foreman will check both of the outside south sprinkler locations to ensure usage.

3. Gary Roberts will spot check on sprinkler usage throughout the day.

What is "baler" for?  
SAS

CHEMETCO  
EXHIBIT 12

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CHEMETCO  
FOUNDRY SPRINKLER PLAN

1. All Foundry foremen are instructed on a regular basis by Oscar Shewmake that the sprinkler system is to be turned on once every hour.

Exception: During the time that the Casting Wheel is in operation, the sprinkler system can not be used.

2. The shift foremen will inform his men that the sprinkler system must be turned on for approximately 3-5 minutes once every hour.
3. The shift foremen will watch this process to ensure its being done, or examine the area after each time it is to have been done for signs of sprinkler usage (i.e. wet Foundry floor).

The shift foremen will check all four inside locations and the two outside north locations to ensure usage.

4. Oscar Shewmake will spot check on sprinkler usage throughout the day.

\_\_\_\_\_  
(approved by Oscar Shewmake)

\_\_\_\_\_  
(date)

Joel,  
Went to Oscar  
this date  
9/22/80  
OS

CHEMETCO

EXHIBIT 12

# C H E M E T C O

EXHIBIT 13

## BOARD OF MANAGERS

November, 1980

### ENGINEERING & PERSONNEL

J. McKell

- Manage the employee training, employment, safety work, collective bargaining, and other employee relations.
- Manage the engineering functions in accordance with the policies set by the Plant and Finance Divisions.

### PLANT

J. Roberts

- Manage the Plant Production, Maintenance, and Cost to achieve highest productivity.
- Direct new development of processes, materials, and equipment by coordinating all efforts.

G. Roberts

- Manage the shipping, sampling, and receiving in accordance with the Production and Commercial Divisions to ensure proper metal accountability.
- Manage the Plant Labor for a clean and efficient plant.

### COMMERCIAL

P. Montagno

- Sell our products at the best price possible in coordination with the efforts of the Production and Finance Divisions.
- Purchase the raw materials at the lowest cost which is consistent with the quality and time of delivery needed.

### TREASURER

T. McRaven

- Manage the accounting, auditing, budgeting and profit planning activities of the company.
- Develop the administration by automation of all functions.

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STATE OF ILLINOIS

SCREENED B!

11/14/80

INFORMATION FOR CHEMETCO

RE: PERMIT FOR EPA

Part VI:

32 (a) State's Attorney:

Nicholas Byron  
103 Purcell, Edwardsville, Ill. 62025

(b) Chairman of County Board:

Nelson Hagnauer  
Court House, Edwardsville, Ill. 62025

(c) Dist. #56:

Rep. Everett Steele  
R.R.#1, Box 10, Glen Carbon, Ill. 62034

Rep. Sam Wolf  
21 Bermuda Lane, Granite City, Ill. 62040

Rep. Jim McPike  
600 Douglas Place, Alton, Ill. 62002

Sen. Sam Vadalabene  
300 Circle Drive, Edwardsville, Ill. 62025

(d) Village Clerk - Hartford, Ill.:

Evelyn Lewis  
507 N. Delmar, Hartford, Ill. 62048

(f) Zoning Agency:

Southwestern Ill. Metropolitan Planning Commission  
203 West Main Street, Collinsville, Ill. 62234

C H E M E T C O

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STATE OF ILLINOIS

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BF

Part VI

32 F

Christ Boettcher  
R. R. 1  
East Alton, Il. 62024  
254-2520

Huebner Est.  
East Alton, Il. 62024

Dave Mueller  
R. R. 1  
East Alton, Il. 62024  
254-4229

Charles Klug  
R. R. 1  
East Alton, Il. 62024  
254-2551

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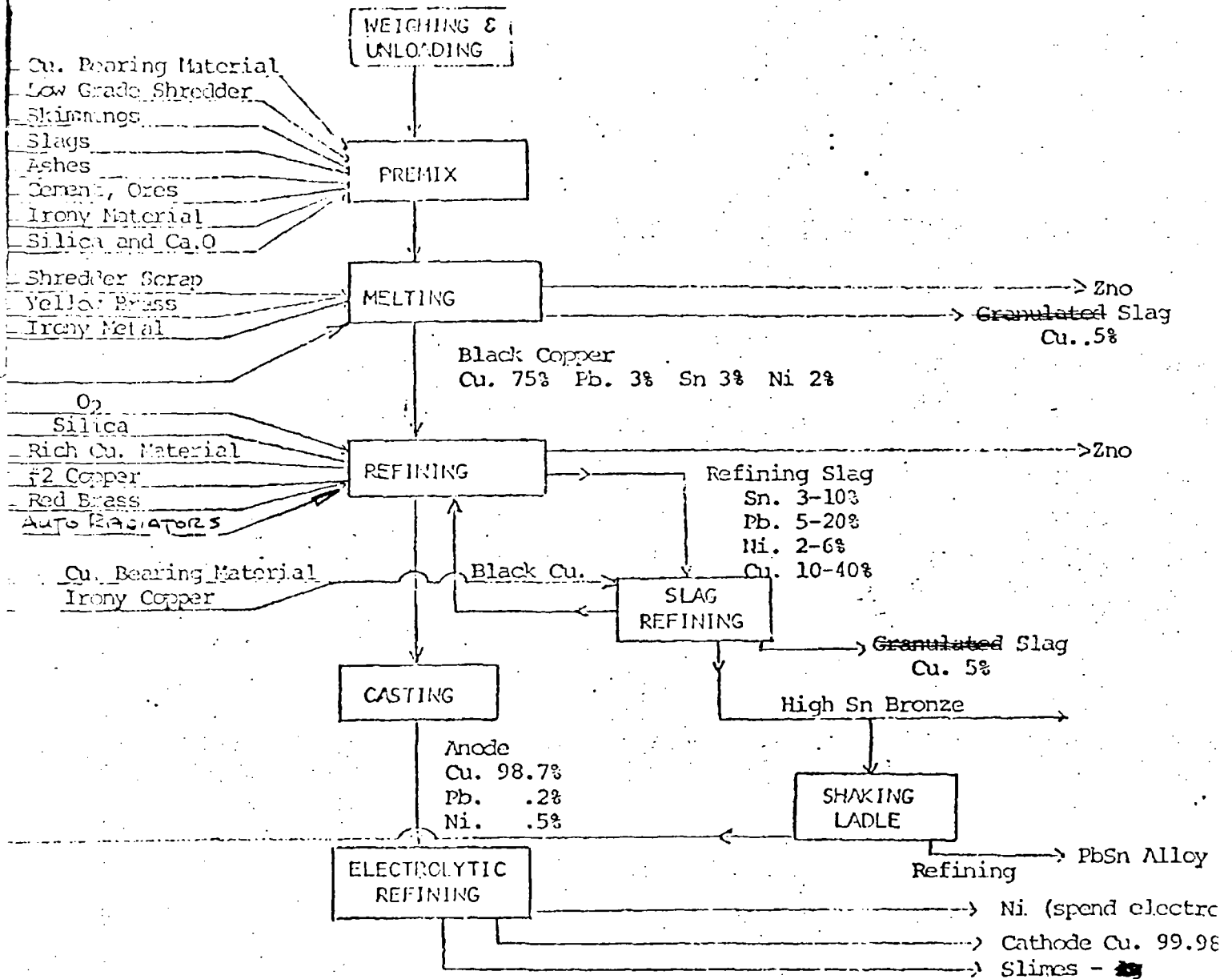
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# F. COPPER REFINING PROCESS

## FLOW DIAGRAM



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STATE OF ILLINOIS

CHEMETCO

EXHIBIT C

SCREENED BF